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Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Twenty-second Annual Meeting, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF THE SECRETARY,
DELAWARE, O., Feb. 16, 1906.

The Twenty-second annual meeting of the Ohio Gas Light Association will be held at Cincinnati, O., March 21st, 22d and 23d.

The President, Mr. Donald McDonald, of Louisville, Ky., will call the meeting to order on Wednesday, March 21st, at 9:30 A.M., in Assembly Hall at the Grand Hotel, the headquarters.

The following will be presented at the meeting:

"Question Box," edited by Mr. Henry L. Doherty, New York City.

"Wrinkle Department," edited by Mr. W. E. Steinwedell, Cleveland, O.

"Novelty Advertising and New Business Methods Department," edited by Mr. George Williams, Madison, Wis.

"Progress Department," edited by Mr. Alfred E. Forstall, New York City.

"Information Bureau," edited by Mr. H. L. Olds, Lincoln, Ills.

"Bureau of Forms and Records," edited by Mr. D. W. Low, Alliance, O.

REPORTS OF COMMITTEES.

"Question Box Revision Board," by Dr. H. B. Harrop, Chairman, Milwaukee, Wis.

"Uniformity of Gas Meters," by Messrs. Chas. H. Dickey, Baltimore, Md.; Paul Doty, St. Paul, Minn.; H. C. Abell, New York City.

"Flow of Gas in Pipes," by Messrs. J. D. Shattuck, Chester, Pa.; W. H. Hammon, Pittsburgh, Pa.; J. O. Johnston, Columbus, O.; H. A. Carpenter, Pittsburgh, Pa.

"Standard Sizes for Coke," by Mr. C. W. Andrews, Duluth, Minn.

"Standard Methods of Testing Fuel Gas Appliances," by Messrs. Henry L. Doherty, New York City; F. W. Stone, Ashtabula, O.; John Franklin, Cincinnati, O.

PAPERS.

"Compressing Gas," by Mr. William M. Welch, Columbus, O.

"Some Economic Relations Between Public Lighting Corporations and the Public," by Mr. W. H. Gardiner, Jr., Boston, Mass.

"Standard Methods of Construction and Operation of Coal Gas Benches—No. 3," by Mr. W. A. Baehr, St. Louis, Mo.

"Readiness to Serve Method of Selling Gas," by Mr. W. B. Tuttle, Long Branch, N. J.

"Producer Gas," by Mr. Henry I. Lea, Pittsburgh, Pa.

"Instructions to Gas Distribution Employees," by Mr. H. M. Robb, Peoria, Ills.

"Protection of Service Pipes," by Mr. R. C. Congdon, Atlanta, Ga.

An opportunity will be given any of the speakers at the meeting to correct their remarks before leaving Cincinnati, but not after, as all of the reports will be turned over to the printer immediately after the meeting.

The Grand Hotel is conducted on the American and European plans, and the following rates have been secured for the meeting: American plan, $3 to $10 per day; European plan, $1.50 to $7 per day.

The Grand has recently been entirely refurnished, and the management hope to entertain all of the Association and will put forth every effort to make the members comfortable. The most satisfactory quarters are always obtained by writing in advance to the hotel people.

LIBRARY OF CONGRESS SMITHSONIAN

The new 2-cent railroad rate in Ohio will be effective before the meeting so that transportation will be greatly reduced for all those who go to Cincinnati.

Although arrangements have not been entirely perfected, I am at this time, through the courtesy of Mr. James E. Stacey, Chairman of the Local Entertainment Committee, permitted to announce the following entertainment.

For the ladies, Wednesday afternoon: Special palace cars to Rookwood Pottery, Eden Park, Art Museum, and tea at the "Country Club."

Thursday afternoon: Special palace cars through Avondale to Norwood, visiting United States Playing Card Plant, Bullock Electric, Globe Wernicke and other large manufacturing plants.

Thursday evening: Theater.

For the gentlemen, Wednesday evening: Smoker at the Business Men's Club.

Thursday evening: Beefsteak Dinner in the cellar of one of the celebrated Cincinnati breweries, and such entertainment as usually goes with this feature.

The privileges of the Business Men's Club, which is but a few blocks from the hotel, will be extended to the membership.

The Secretary will furnish with pleasure application blanks for membership and any other information which may be desired relative to the meeting.

T. C. Jones, Secretary.

BRIEFLY TOLD.

Arguments and Facts.—"X.," writing to us under date of the 6th inst., forwards the following: "The arguments in favor of the use of instantaneous water heaters for domestic use, are so strong and convincing that it seems a pity to weaken them by claims that cannot be sustained. In the paper of Mr. H. J. Long, published in your issue of Feb. 26th, it is stated that the efficiency of a good appliance of this character is '80 per cent. and over,' which is 'important if true,' and the figures to substantiate the statement would be of great interest. The data given of a test made with one of these heaters, during the greater part of September and October, are sufficiently complete to criticize intelligently; but assuming that the gas had a calorific power of 655 B.T.U., and that the temperature of the water on entering the heater was 62° F., the heater would show an efficiency of 100 per cent. If the gas were Pittsburgh gas this assumed heating power is only slightly too low, and the temperature of the water averaged, say on October 1st, would probably be less than 62° F. The effect of a slight reduction in this temperature is more important than an increase in the calorific power of the gas, and might easily show an efficiency of more than 100 per cent. for the heater."

Eighty Cent Gas for New York.—Last Thursday the Senate agreed to the Agnew bill originally introduced by him in the Assembly and by that body indorsed, putting the selling rate for gas in New York city at 80 cents per 1,000 cubic feet. As explained in the New York *Sun*, of the 9th inst., the Agnew measure is a city bill and goes to Mayor McClellan for his approval before it goes to the Governor for his consideration. According to the provisions of the bill, as these are detailed in the public prints of last Friday, the price of gas after May 1st next in New York city will be 80 cents per 1,000 cubic feet, with the following exceptions: Second and Fourth wards, Queens Borough, and Thirtieth ward of Brooklyn, $1. In the Third ward of Queens, the Thirty, the Thirty-first ward of Brooklyn and all over Richmond Borough, $1.25 for the remainder of 1906, the price to go to a final figure of $1, which will be reached by 5 cent reductions per year in 1911. In that district of the Bronx Borough formerly in the town of West Chester, outside the villages of Wakefield and Williamsbridge, the rate is to be $1.15 in 1906; and 1907-08, $1.10; in 1909, $1.05; $1.05 in 1910, and $1 in 1911 and thereafter.

Notes—

Mr. Charles Forbes, for many years Manager of the London (Ont.) Gas Company, has been engaged as Manager of the Ottawa (Ont.) Gas Company. We have no need to say that Mr. Forbes knows how to increase gas sales.

Mr. D. F. Johnson has succeeded Mr. H. B. Maynard, as Superintendent of the Elkhart (Ind.) Gas Company.

The output of the Ottawa (Ont.) Gas Company, which competes with two other concerns that supply light and heat to that city, increases rapidly. The proportion, as between the output for light and heat, is as 82 is to 18.

[Official Report.—Revised by the Secretary.]

THIRTY-SIXTH ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Held at Young's Hotel, Boston, Mass., Feb. 20 and 21, 1906.

First Day—Feb. 20—Morning Session.

The 36th annual meeting of the New England Association of Gas Engineers convened at Young's Hotel, Boston, on Tuesday, February 20, 1906, at 10:50 A.M., with the President, Col. F. S. Richardson, in the Chair.

The President—Gentlemen, the meeting will please come to order. Some of the representatives of the exhibits here given have kindly consented, and upon their own suggestion, to close their rooms during the sessions. If those others that have not considered that subject in the same way would kindly do the same it would be duly appreciated, not alone by the individual members of the Association, but particularly by its officers, in view of the fact that the meeting itself can be made interesting and instructive if we are all here and give attention to the matters at hand, and then afterward view the exhibits and do other things that you need to. The first matter of business is the reading of the minutes of the last meeting.

Mr. Africa—The "Proceedings" having been published, I move that the reading of the minutes be dispensed with. [Adopted.]

Report of the Board of Directors.

The President—Next will be the Report of the Board of Directors, which will be read by the Secretary.

The Secretary read the following:

To the Members of the New England Association of Gas Engineers:

Gentlemen—Your Directors have received the following applications for membership, and would recommend their election in the same classes, provided the initiation fee is paid.

Active.

Frank P. Vogel, Treas., Claremont Gas Light Co., Claremont, N. H.

James M. McClellan, Supt. Everett Works, Boston Consolidated Gas Co., Everett, Mass.

Howell Fisher, Asst. Supt. Everett Works, Boston Consolidated Gas Co., Everett, Mass.

H. M. Belle, Supt., the New Britain Gas Co., New Britain, Conn.

Frank A. Goodwin, Foreman Gas Dept., Rockingham County Light and Power Co., Portsmouth, N. H.

J. S. Whittaker, Supt., Rockingham County Gas and Power Co., Portsmouth, N. H.

Waldo C. Bill, Supt., Capital City Gas Co., Montpelier, Vt.

Charles R. Prichard, Supt., Beverly Gas and Electric Co., Beverly, Mass.

John B. Dolan, Supt., Jamaica Plain Division, Boston Consolidated Gas Co.

Associate.

Blake H. Fussenick, Torrington Electric Co., Torrington, Conn.

H. T. Sloper, Secy., the New Britain Gas Light Co., New Britain, Conn.

C. E. Paige, Supt., Malden and Melrose Gas Light Co., Malden, Mass.

G. Warren Stiles, Street Supt., Malden and Melrose Gas Light Co., Malden, Mass.

E. I. Storer, the New England Gas and Coke Co., Malden, Mass.

George A. Caldwell, H. Mueller Mfg. Co., Boston, Mass.

Frederick S. Pratt, Vice-President, Fall River Gas Works Co., Boston, Mass.

Lyman A. Ransehousen, Chemist, Springfield Gas Light Co., Springfield, Mass.

E. N. Wrightington, Secy. and Manager, Commercial Dept., Boston Consolidated Gas Co., Boston, Mass.

George A. Stiness, Treasurer Pawtucket Gas Co., Pawtucket, R. I.

A. W. Crowther, Foreman, Gas Works, East Boston Gas Co., East Boston, Mass.

Mark R. Leavenworth, New England Representative, Rand Mfg. Co., Pittsburgh, Pa.

R. Grant, Treasurer Boston Consolidated Gas Co., Boston, Mass.

Would also report that the resignations of the following have been recommended for acceptance: R. W. Bush, C. D. Sherman, F. F. Fussenick, F. Tudor.

They have also examined and approved for your consideration, the following papers:

"Thermic Consideration of the Retort Bench;" by Mr. D. D. Barnard, Worcester, Mass.

"Gas Works of the Charlestown Gas and Electric Company as Remodeled in 1905-6;" by Mr. Samuel J. Fowler, Charlestown, Mass.

"Some Notes on Mechanical Coal and Coke Handling Devices;" by Mr. Holyoke, Springfield, Mass.

"Effect of Gas Burning on Atmosphere of a Room;" by Mr. A. P. Beardsley, New Haven, Conn.

Respectfully submitted, N. W. GIFFORD.

The President—Gentlemen, you hear the report of the Directors. Mr. Allen moves that the report of the Directors as presented by the Secretary be accepted. [Seconded and adopted.]

ELECTION OF NEW MEMRERS.

The President—Next is the election of new members.

Mr. Prichard—I move that the Secretary be authorized to cast a ballot for the applicants whose names have been read. [Seconded and adopted.]

Vice-President McGregor assu med the Chair, and President Richardson read his

INAUGURAL ADDRESS.

[For the text of President Richardson's message, see JOURNAL, March 5, p. 398.]

COMMITTEE ON PRESIDENT'S ADDRESS.

The Vice-President—Gentlemen, we have listened to an admirable address, bristling with points. I take pleasure in appointing Messrs. Nettleton, Lamson and Quinn as a committee to review the address and make their report and recommendations thereon.

The President—The Association would extend an invitation, a generous one, to all that are here, whether they are members or not, to come in and sit down during the session. Gentlemen, the next business will be the

REPORTS OF THE SECRETARY AND TREASURER,

which Mr. Gifford read as follows:

REPORT OF SECRETARY—1905.

To the Members of the New England Association of Gas Engineers: Gentlemen—At the last annual meeting there were 12 new members added to the rolls and 9 resignations accepted. During the year there have been 4 removals by death. There are now on the rolls: Seven honorary, 149 active and 75 associate members.

During the year a paper by Mr. W. A. Learned, of Newton, Mass., on "Asphyxia" was printed, and several copies mailed to each member of the Association.

The "Proceedings" for the years 1904-1905 have been printed in bound volume and distributed to the members.

Respectfully submitted, N. W. GIFFORD, Secretary.

TREASURER'S REPORT—1905.

Receipts.		*Paid for.*	
Bal. Cash on 1/1/05.....	$160.26	Postage.....	$16.82
Dues, 1905.....	765.00	Telegrams	1.75
" 1904.....	60.00	Salary, 1904.....	200.00
" 1903.....	9.00	" 1905.....	300.00
Sale—Proceedings.....	7.00	On account library.....	77.50
Admission fees.....	25.00	Flowers.....	35.00
Sale—Badges	5.00	Express.....	.90
Dinner tickets.....	417.00	Music.....	12.00
		Ex. charge, checks.....	.70
		Printing.....	106.25
		Asphyxia	46.95
		Proceedings 1904-05.....	5.00
		Hotel bills.....	581.65
		" "	6.00
		Reporting meeting	14.35
		On hand 12/31/05.....	43.39
	$1,448.26		$1,448.26

The funds of the institution are $43.39 in the Treasurer's hands and $323.66 deposit in the East Boston Savings Bank, a total of $367.05. The cash book bears the signatures of the Auditing Committee, Messrs. Wm. McGregor and D. D. Barnum.

[On motion, the reports were accepted.]

The President—Although it is not indicated, perhaps it might be a source of pleasure, if nothing more, to hear the

REPORT OF THE LIBRARIAN,

which was read by the Secretary as follows:

There have been added during the year to the library the following:

2 Vols. AMERICAN GAS LIGHT JOURNAL.
2 " Pacific Coast Gas Association Proceedings.
1 Vols. Question Box—Ohio.
1 " American Gas Light Association.
1 " Massachusetts Gas Commission.
1 " Rept. Parliamentary Committee on Water Gas, 1899.
4 " Gas World Year Book, 1898-1901.
1 " Treatise on Gas and Ventilation.
1 " Photometrical Standard, 1897; Van Equdhoven.
1 " Photometrical Measurements, 1900; Stine.
1 " By-Product Coke Ovens, United Gas and Coke Company.
1 " Gasfitters' Questions and Answers, Dunbar, and also a collection of Association programmes, menus, miscellaneous, and souvenirs from the collection of the late Mr. A. B. Slater.

The librarian recommends an appropriation for the purchase of such books as may seem advisable, and also that the librarian be authorized, by request, to send books from the library to members, they to pay the expense of returning same. A library similar to this of the Pacific Coast Gas Association is in successful use, and is said to have something like 30 volumes in circulation among its members nearly all the time. If this library is to be maintained it seems as if some means should be taken to make it of use to the members.

I might add too, if the Chair will pardon me, that the library is housed in Room 715, Tremont Temple, which is the library of the Boston Society of Civil Engineers. The arrangement with that Society is that our members may use their library in the room. I do not understand that we are at liberty to take their books away from the room, but we may consult them in the room. They have a very complete library, as was explained by Captain McKay some time ago. There have been sent in at various times quite a number of forms used by the various companies in the conduct of their business. These have been arranged somewhat hurriedly in display boxes, and labelled with the names of the companies, so that there are quite a number of recent office forms represented there, which might be of interest in some cases for persons who are thinking of changing their forms to look over. Those of you who have read carefully the last volume of the Proceedings will note in the back of the book a list of the books in the library, which is nearly complete. I think there are one or two addditions since printed, and it would seem as if there was material there of value to the members. The librarian is anxious that members avail themselves of the library.

The President—It is a fact that the library is of value, but it is also a fact that there are very few members comparatively who are within reaching distance of it, to take advantage of its location and all the conveniences. Many live far from Boston and come infrequently; others who come frequently have not the time. A small appropriation might be spent with great advantage. Perhaps it is not known, but keys can be had for the price of 25 cents, and they are to be obtained at the library itself. It would be advantageous perhaps if some discussion upon this matter be had now, and if any members care to express their opinions looking toward a definite vote upon the suggestion made by the Secretary it will be very gladly received. Captain McKay, this is your child in a great degree. Possibly you do know what to suggest to make it of more importance and greater interest to all of us.

Mr. McKay—Mr. President, the librarian has succinctly stated the true kernel of the case, that the material is there and that the next thing is to get the members to make full use of it. A large percentage of the membership of the Association is resident comparatively near the library, and for the benefit not only of those but of all, if the suggestion of the librarian could be adopted, permitting him to send books to be returned at the expense of the members, it seems that would be a long step in the right direction of making the library of great use. From a small beginning it has now grown so that we have a typical collection of literature on the subject of gas, and it is some satisfaction when one goes there to be able to find information on nearly any gas topic. I hope the suggestion of the librarian will prevail, and I move that the Association authorize the Secretary to purchase books for the library and to distribute the books upon the application of members in the manner that he has described. I have found libraries of this sort available in very many cities in England and in Europe, and not only were there books in the library, but they were also out of the library and being used by the people in the industry. I think it is due to the general use of all sources of information that in some measure is to be ascribed the progress in many of the details of the business that is evinced by our foreign contemporaries. [The motion was seconded.]

The President—You hear the motion of Captain McKay, which is duly seconded. Are there any further remarks upon this subject, which in itself is an important one in my opinion?

The President—It stands that the Secretary and Treasurer shall in his discretion spend the amount of money necessary to carry out the suggestions made in his report. Prior to the next programme item, which is the reading of correspondence, I will name as a

COMMITTEE ON NOMINATIONS,

Messrs. W. E. McKay, W. A. Learned and W. A. Wood.

NOTING THE CORRESPONDENCE.

The Secretary—I have several letters here, mostly of regret. Those of acceptance I have not brought into the meeting, because I thought the writers would answer for themselves by their presence, if not otherwise. With your permission, as there are so many of these, I will merely read the names: Messrs. W. R. Addicks, H. L. Doherty, Thomas E. Byrne, Frederick Egner, Fred. S. Benson, Austin C. Wood, J. B. Klumpp, F. R. Persons, A. E. Forstall, F. C. Sherman, Paul Doty, A. C. Humphreys, T. C. Jones, J. A. P. Crisfield, A. S. Miller, W. B. Tuttle, F. Schniewind and Irvin Butterworth. I would say that these gentlemen express great regret, and very cordial greetings, and hope that the meeting will be a success.

The President—It has been a matter of real regret that so many of the friends whom we have usually seen here, for one reason or another, are kept from coming; but there is a large attendance, which is eminently satisfactory and very pleasing. There is but one committee to report, and to that a brief reference has been made. I refer to the Committee on Electrolysis. The Chairman, Mr. Prichard, is here, and he may want to say something before the Committee reports.

Mr. Prichard—Mr. President, there were some slight changes I wanted to make in the report. I would prefer to read it this afternoon.

The President—So I understood. The Committee on Electrolysis will hand in its report during the afternoon session.

The President then introduced Mr. S. J. Fowler, of Charlestown, Mass., who read the following paper entitled,

GAS WORKS OF THE CHARLESTOWN GAS AND ELECTRIC COMPANY AS REMODELLED IN 1905 AND 1906,

prefacing it as follows:

Before reading my account of what has been done and is to be done at the Charlestown works, I wish to express my regret that the story cannot be carried out to the end. The carbonizing and purifying plants are both done and working successfully, but the machinery with which the coal is to be handled from the coal shed into the retort is not in place, and consequently we are not yet able to tell what our labor costs are going to be. No comparison can yet be made between our plant and that of the other companies which have put up modern retort houses as to cost of operation. This will have to come later. This paper is really a year ahead of time, and would hardly have been presented here if I had not expected that it would be accompanied by like and more thorough papers on several other modern retort houses.

The Charlestown Gas and Electric Company has for some years bought most of the gas it has distributed, but owing to changed conditions it was deemed advisable that the Company should be in a position to make its own gas after July 1, 1906.

The contract under which the Company has been purchasing gas, provided that a certain quantity should be made daily at our works, but the supplying Company kindly consented to furnish the whole of the gas required during the period of reconstruction. The works of this Company were therefore shut down on March 27th. They were started again on December 4th, after the lapse of 8 months and 1 week.

The condition of things in the iron business has been such during the year, that it was impossible to get the necessary ironwork promptly, or we should not have been more than 6 months in completing the whole enterprise. As it is, we have not been able to put up the new retort house roof, for, though the order was given in July, the iron was not delivered to the contractors until late in November—too late to put on the roof this winter.

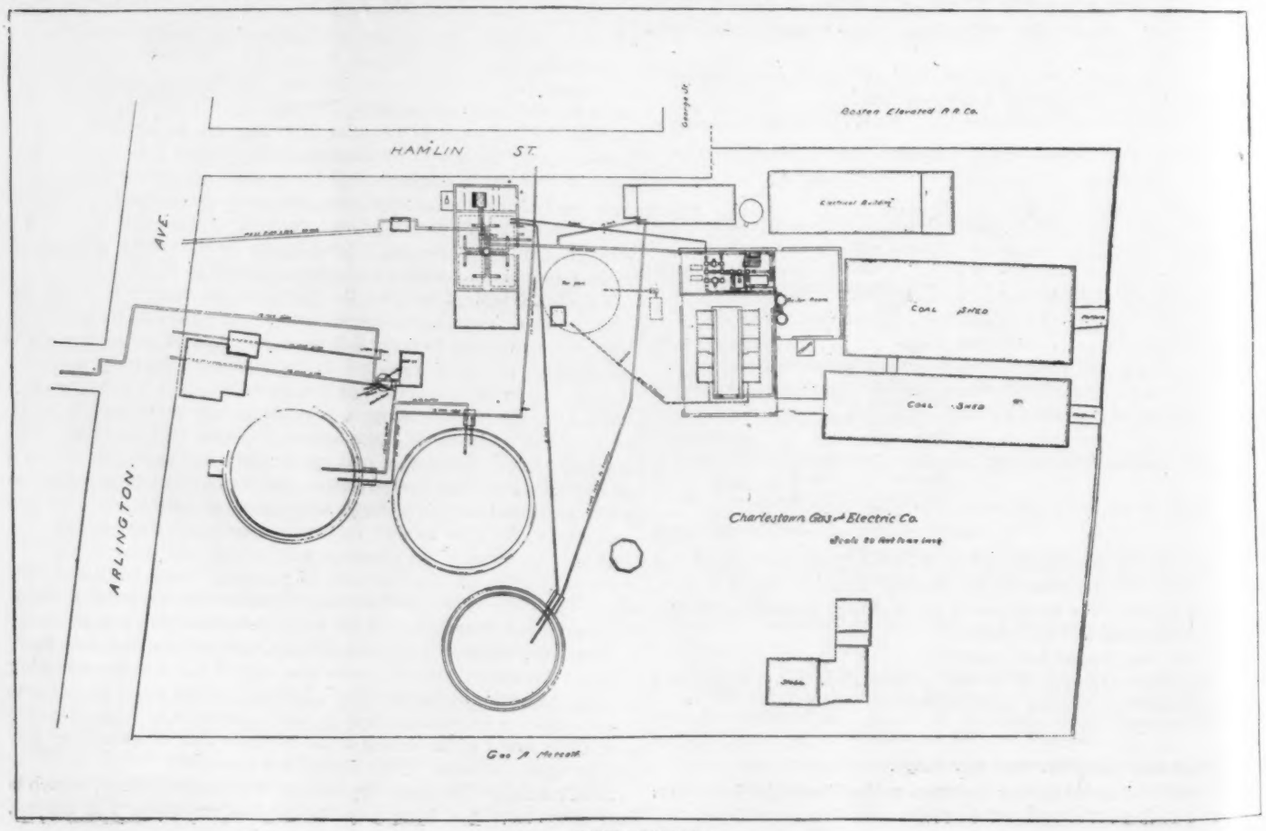
The works are situated on the right bank of the Mystic river, an estuary of Boston Harbor, on a rectangular plot of land of about 5 acres. The difference between mean low water and mean high water at Boston is about 9 feet.

When it was decided to rebuild the works, the plant of the Company was old and antiquated and was inadequate to produce economically the gas needed.

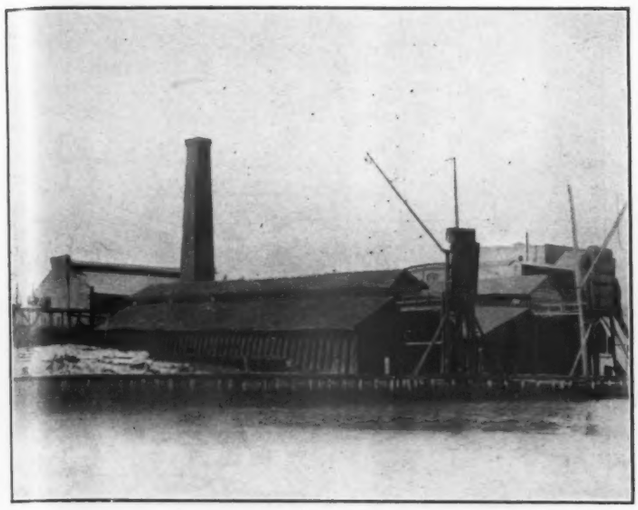
It consisted of a stone bulkhead with 13 feet of water at high tide. Adjacent were two coal sheds, together of about 5,000 tons capacity. There was no machinery with which to get the coal from the vessels into the coal shed, except a steam engine to hoist the coal tub.

The retort house was built in the early 70's and contained 12 benches of 6's. The arches were 7 feet 6 inches wide with 18-inch partitions.

The retorts were 14 inches by 26 inches or 28 inches 9 feet long with mouthpiece contracted to 19 inches; 7-inch standpipes reducing to 6



Old Plan of Works.



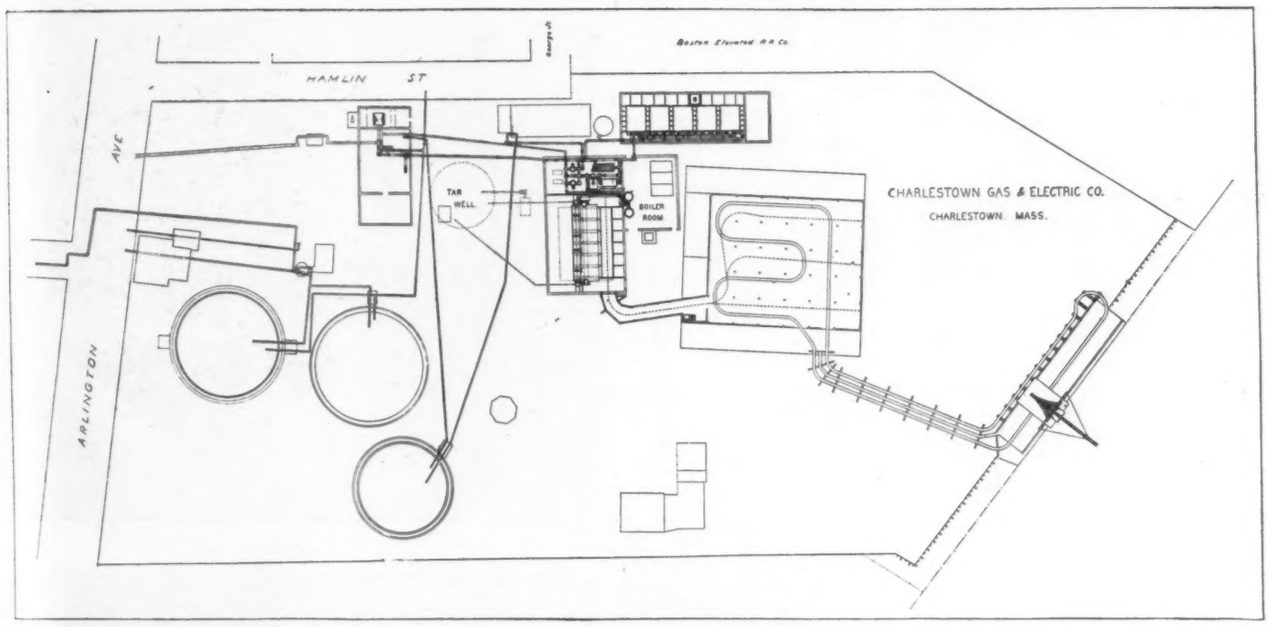
Old Coal Shed.

in its coal only by water, and in a climate where the ice may stop navigation for a couple of months. It was decided, therefore, to put up a coal shed of 10,000 tons capacity, and in connection therewith to build a new pile wharf out in the stream, so as to get the advantage of a greater depth of water and thereby of lower freight rates.

This necessitated the provision of means for conveying the coal from the wharf to the shed, and, almost as a matter of course, of a machine for taking the coal from the boat to put it on the conveying system.

This whole affair consists of an approach 120 feet long to a wharf 142 feet by 32 feet, with a trestle on it, on which is the track for the Hunt cable car system and also the track for the tower.

In the tower is a Rawson & Morrison bucket digger with boiler and engines, which bucket discharges its load on to an incline, the lower end of which is a grating through which all the fine coal falls. The other coal passes through a Hunt coal cracker, by which it is broken to a 2½-inch size and falls into a bin. From here it is dropped into the cars which take it up the approach to the desired point in the coal shed. The coal shed, 140 feet square and about 40 feet high, is of so-called mill construction; *i. e.*, of heavy timber and a plank roof covered with tarred paper and gravel. Both sides and one end are not carried up above the height to which the coal would naturally fall when discharged from the cars, thus forming a monitor 100 feet by 120 feet. This way of building reduces the expense very materially by lessening



New Plan of Works.

inches. Ten of the furnaces were half-depth recuperative. Between the retorts and the purifiers the machinery was in fairly good condition, as it had been remodelled in 1902.

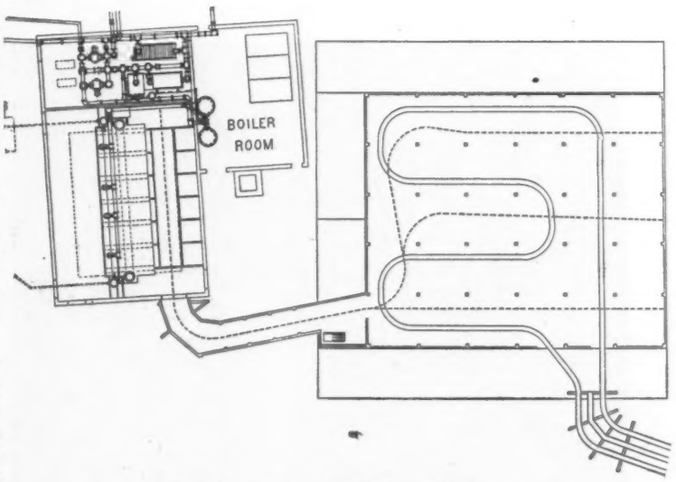
There were two old 6-foot boilers set on end in multiple with the tubes left in, which act as preliminary condensers, two McKenzie exhausters, a Walker tar extractor, a condenser and a Standard ammonia scrubber. This is all in a building contiguous to the retort house.

The purifiers were 20 feet by 15 feet by 3½ feet, in a building about 100 feet from the machine room, as we call the room where are the exhausters, etc.

In addition to what I have enumerated there is a 6-foot Granger water gas set, which has not been used for some years and which under present conditions of price of gas naphtha and anthracite coal is extremely expensive to run.

The total capacity of the coal gas plant was about 600,000 cubic feet per day, which was also about all the purifiers could take care of; whereas the winter output was regularly about 700,000 cubic feet per day, and had been nearly 900,000 on one particular day. The chances for growth are not large, but a small increase in consumption can be depended upon. There is no great future to look forward to, but a fair business can be expected.

Under these circumstances I was very unwilling to spend any money unless I could see that it would give returns in the immediate present. But for a production of 190,000,000 cubic feet per annum a 5,000-ton coal shed is manifestly too small for a plant so situated, that it can take



Plan of Retort House, Coal Sheds and Tracks.
Double line shows cable car track. Dotted line shows Brown-Hoist trolley track.

the need of strong bracing. At the water end, however, the shed was left high, so that if an extension should be desired in the future it can easily be made.

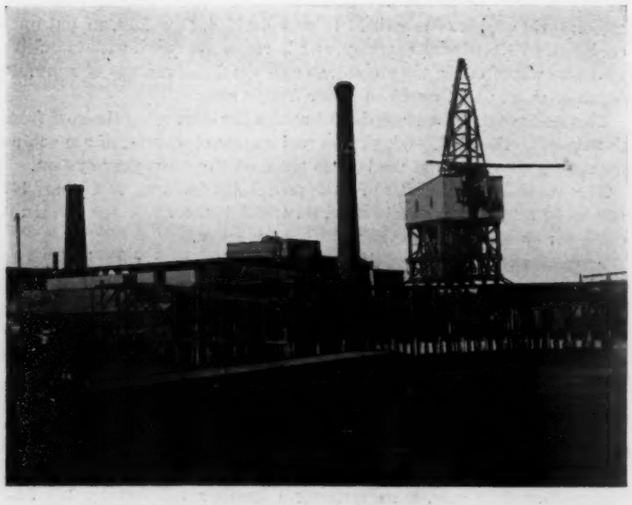
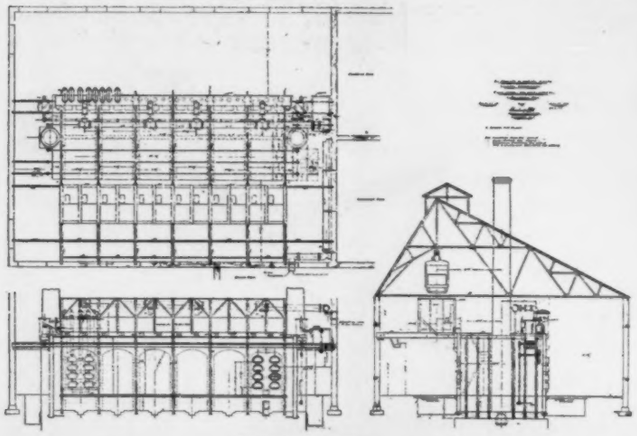


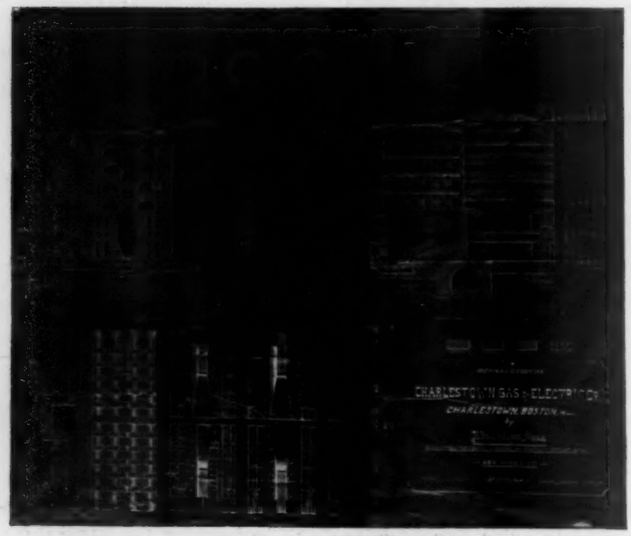
Photo. of New Coal Shed, Tower, Etc.

In the old retort house we had had satisfaction in the half depth Weber furnaces and the men were accustomed to running them. What I wanted to secure was increased capacity and by the use of larger carbonizing units and machinery for operating them, economy in working expenses.

My original plan was to use the half-depth Weber furnaces we already had and, by tunnelling under the bench, make a flue under the center so as to admit of through retorts. Then I was to raise the arch and utilize the old hydraulic main, standpipes, mouthpieces, etc.



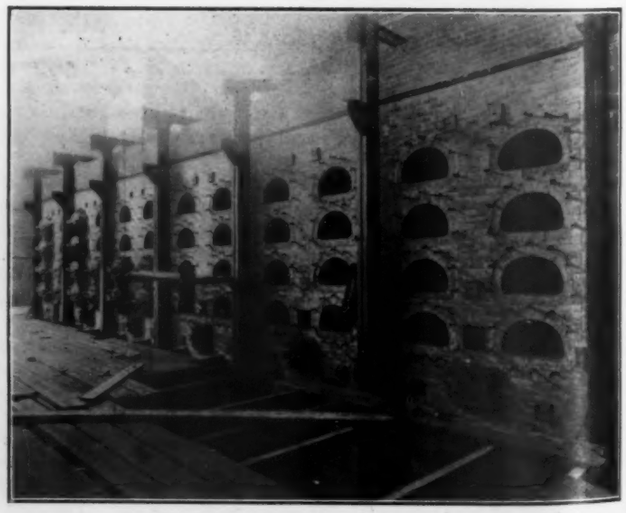
Retort House Plans.



Plan of Firebrick Work.

Foundations—Main Flue.

Arches.



Retorts.

But this plan soon proved to be entirely impracticable. All the old bench was torn down and scrapped, except some of the furnace fittings, and everything was put in new. An increase in the size of the retort house building which is in fair condition would have involved us in considerable expense and, though a widening of the arch from 7 feet 6

inches to 8 or 9 feet, was strongly urged by various bench builders, I decided to retain the old dimensions, and to put into the 7-foot 6-inch arch 8 retorts, 15 inches by 26 inches, 20 feet long, thus retaining in the old house the exact dimensions of the old block, except that each end the chimneys encroach on the passageway.

The most difficult problem in this scheme was how to take the gas from the retorts to the hydraulic main, for of the total of 9 feet in a horizontal line from center to center of the partition walls the buckstays took up 10 inches and the mouthpieces 56 inches, making 66 inches and leaving but 42 inches free space, of which 16 inches are between the mouthpieces, and 13 inches between the mouthpieces and the buckstays at each side, so that it was plainly impossible to bring two standpipes up either at the sides or in the center.

As I intended to work the house with projecting coal charges, which move from bench to bench on the same level, I did not wish to connect the mouthpieces together in a vertical line and I therefore devised a plan for connecting them in a horizontal plane. The two lower mouthpieces are connected together with an 8-inch pipe, and both discharge through a 10-inch pipe at one side of the bench. The next pair of retorts are connected in the same way and discharge through a 10-inch pipe at the other side of the bench.

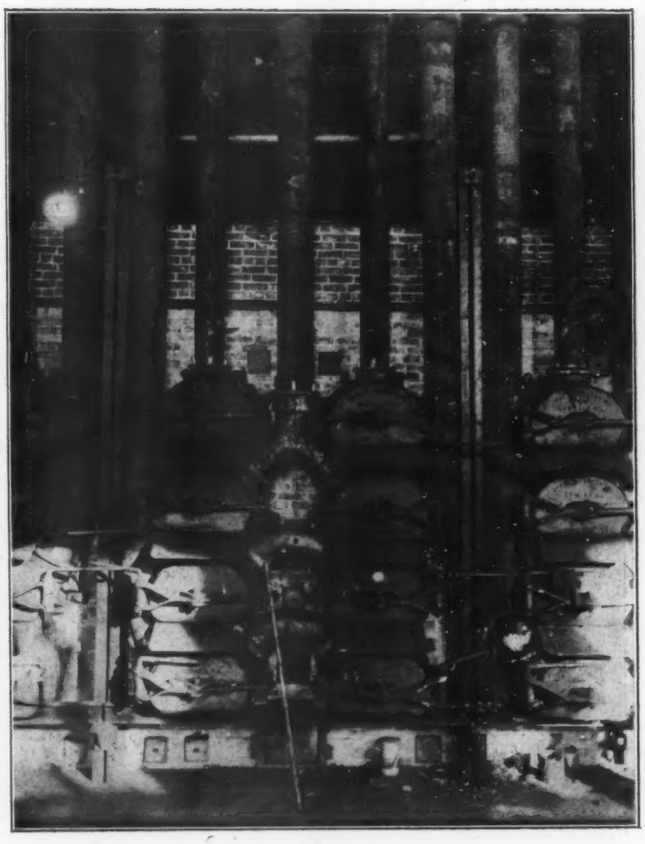
The next two discharge each through an 8-inch pipe into a 10-inch pipe at the center of the bench and the top retorts discharge through vertical 8-inch pipes. So far the plan has worked perfectly. My only regret is that there are any 8-inch pipes in the connections, for now we have to use two sizes of cleaning tools, which is unnecessary and undesirable.

We are working the benches entirely by hand now, and, on a carbonization of just 30 gross tons per day in 2 benches, are using the same amount of labor we should have used in our old plant. The only economy is in the consumption of coke, which is somewhat smaller.

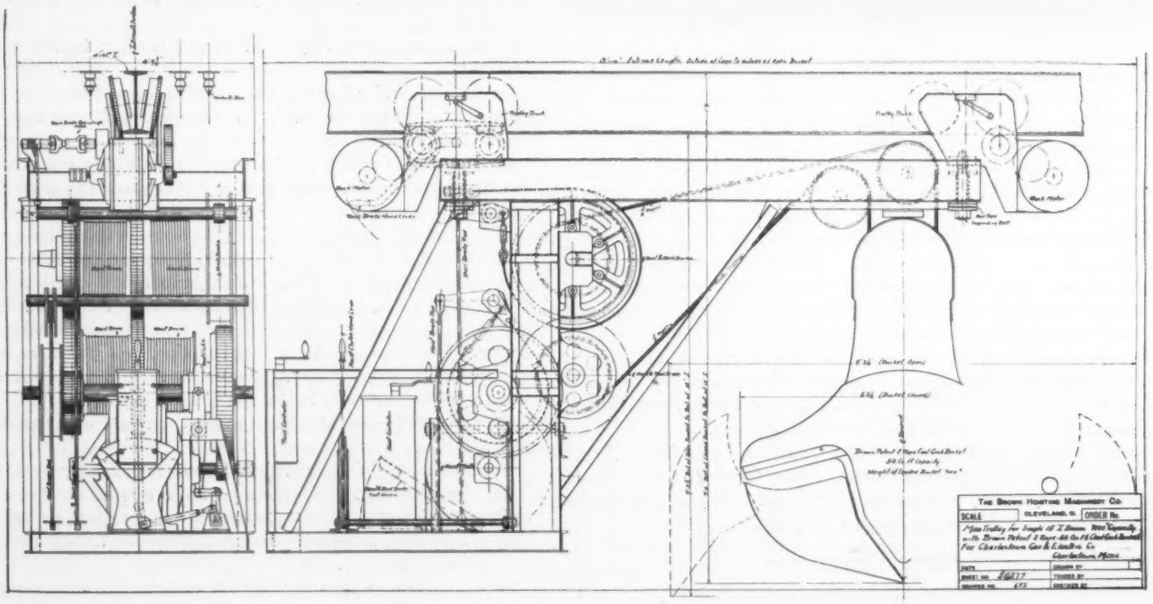
I expect further economy when we have the machinery installed.

This is to consist of a Brown-Hoist digger mounted on a 15-inch I-beam to take the coal from the coal shed into the retort house and to deposit it there in the overhead bunkers in front of the retorts.

From the bunkers the coal will be dropped into the centrifugal charging machine, which will throw it into the retorts.



Face of Bench.

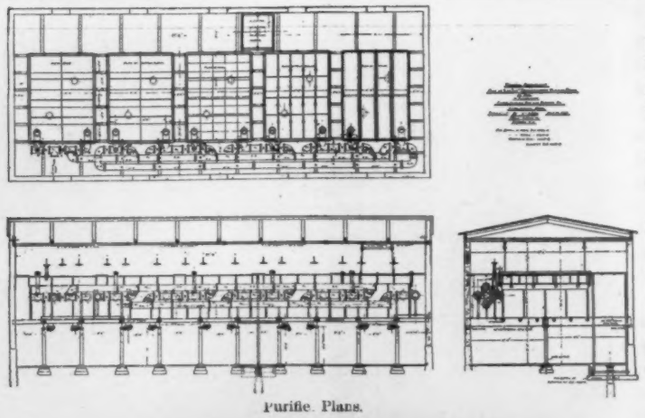


Trolley for Taking Coal from Shed to Retort House.

When the charges are carbonized they will be pushed out of the retort by a telescopic pusher. I have as yet made no arrangements for taking the coke out of the retort house by anything except the old style of coke cart moved by hand, preferring to wait awhile before adopting any machinery.

Passing the exhauster and scrubbing plant—what I like to call the machinery room—we come to the purifiers, which I have set up in a building about 100 feet by 40 feet, formerly used as an electric light station.

Our old purifiers were in apparently good condition, so I decided to deepen them to 10 feet by putting in additional plates at the sides, which has been done. I have adopted the valve system instead of the old center seal, so that we can now run 4 boxes in series instead of 3. Apart from the depth of the boxes there are but two points of especial interest in the purifying plant. First is the arrangement for blowing out the air when we put on a new box. This consists of a 6-inch pipe on the inlet of the box, which, when we want to put the box into service, is opened. The outlet valve is then also opened and the clean gas from the make or from the holder rushes into the box and very quickly drives out the air through the open 6-inch pipe, giving the air and gas very little time to mix and making the blowing-out process a very short one. Second, in front of the purifiers I put in an extra box just like the others, with simple bye-pass connections, to use as a scrubber to take all the tarry matter out of the gas, and if necessary to use as a lime



Purifier Plans.

Purifier Boxes in Course of Erection.

box to remove the sulphur compounds other than sulphuretted hydrogen. We now have one layer of a foot or so of shavings in the bottom, which seems to remove the tarry matter completely.

This catch box is so arranged that all the gas goes into the bottom and must rise through any layers of shavings or lime that may be in the box.

The purifier boxes, however, are arranged so that the gas may go through any one of the three layers into which the oxide is divided. The gas enters at the bottom and also between the center and top layers, and is taken off from between the bottom and center layers and also from the top of the box.

For removing the oxide there are two 16-inch holes in the bottom of each box closed by doors resembling self-sealing retort lids and in the trays above these doors are holes of the same diameter, so that on top of the doors is simply a column of oxide 10 feet thick.

It is my expectation that on opening the doors this column of oxide will fall through the opening, leaving a hole through which the rest of the oxide can readily be thrown, but—we haven't yet opened a box.

(To be Continued.)

[Abstract.—Continued from Page 406.]

FIFTH ANNUAL MEETING, WISCONSIN GAS ASSOCIATION.

Held at the Hotel Pfister, Milwaukee, Wis., February 14–15, 1906.

First Day—Afternoon Session.

Discussing the Paper by Mr. H. M. Cutcheon.

[For the text of the Cutcheon Paper, see Journal, March 5, p. 404.]

[During the reading of the paper Mr. Cutcheon made several comments in explanation that cannot very intelligently be reported here without diagrams.]

Mr. Crawford—I was very much interested in the paper. The experience of the reader of the paper is similar to what we have had in Waukegan, Ills. I would like to ask the writer, however, if he has kept any record of the labor charges on compression per 1,000. He mentioned the cost of materials, but said nothing about labor.

Mr. Cutcheon—The men that we use for handling compressors we have to have anyway as head stokers, so we figure that the labor does not cost us anything.

Mr. Crawford—The reason I inquired is we have been figuring a labor charge, and I was anxious to know whether we were right or wrong in our cost per 1,000 for compression.

The President—What is the cost of the labor charge that you figure?

Mr. Crawford—Our complete cost we estimate to be 3 cents per 1,000 feet—material and labor. Of course, we base our total cost for a month's business on the amount of gas compressed, and estimate then the cost of material used, the balance of the gross cost, of course, being labor.

Mr. Cutcheon—What material do you figure beyond oil and ordinary repairs?

Mr. Crawford—By material I should say fuel—I mean fuel and oil.

Mr. Cutcheon—I think with us 2 cents per 1,000 feet would cover everything, without doubt. The fuel cost, as I stated, was not over 1.9 cents per 1,000 feet.

Mr. Kimball—Do they in Neenah and Menasha still keep that holder full as a reserve proposition? I am also interested to know as to the comparative cost of a storage capacity on a pressure tank and the ordinary holder.

Mr. Cutcheon—We have not had any gas in the Neenah holder for the past 2 years. We figured that the cost of keeping steam on that holder during the winter would more than offset the advantage of having that reserve. As far as the capacity of the high pressure storage tank, and storing a similar capacity in a lower pressure tank, are concerned, having reference to cost, it makes no difference with us, because we have to pump that amount of gas anyway. We do not pump any more than we are obliged to.

Mr. Kimball—The point I have in mind is, in case of repairs at the end of the line, where you had a holder already, would it be cheaper to put in your tank on the line, or put in another compressor, say to work by electricity, and have your reserve so that you could pump from both ways.

Mr. Cutcheon—That is, you mean to put on a booster at the end of the line?

Mr. Kimball—No; I mean in case of a breakdown on your line the other way. You are using your pressure tank now as a certain reserve. Suppose you cut the line for an hour or two where you have a holder, would or would not the cost of a duplicate compressor set as a reserve be such that it would render it inadvisable to employ it for that purpose?

Mr. Cutcheon—Well, a breakdown occurs so infrequently that really it cuts no figure, but when it comes to the question of cost of storage in a high pressure storage tank, or storage in a low pressure holder, you cannot draw any comparison, because we only compress enough gas to take care of the output, and if we used a low pressure holder we would simply fill it from the high pressure line, and would be compressing that amount of gas anyway. As far as repairs are concerned, these occur probably not over half a dozen times a year.

Mr. Crawford—Do they have more than one compressor at Appleton?

Mr. Cutcheon—We have two compressors of nearly equal capacity.

Mr. Crawford—At Waukegan we have two of one type and one of another, so that we estimate it requires the greatest part of one man's time to look after those compressors and do the additional work necessary to pump that gas.

Mr. Cutcheon—I have two 8 by 10 straight line compressors, and I do not think that it takes more than 2 hours' time of 1 man the whole day through to look after them. I am quite sure of it. And that man we would have to employ anyway.

Mr. Cutcheon—I think Mr. Mainland could tell us something about district regulators, for they use them in the city in manholes, and he would know whether their use is satisfactory or not.

Mr. Mainland—About a year ago, finding that we were lacking pressure on the low pressure pipes, we put in regulators and ran high pressure pipes at different places and got our pressure up where we wanted it. We haven't anything to say except that it worked all right—we have not been going long enough to find any troubles in that line. In one place, for some reason or other, water got in and spoiled one of the regulators, but we changed that, and that was the only trouble we had. It has been very satisfactory in bracing up mains where we did not

went to put out low pressure pipe lines—to brace it all up—it has been very satisfactory.

Mr. Leuenberger—I would like to ask about the tanks with and without the baffle plates. Is there any difference in the working?

Mr. Cutcheon—I have only had experience with the tanks without the baffle plates; that is, we put in a tank without the baffle plates along in the first part of this January, but there does not seem to be any difference at all It seems to throw down all the moisture. No moisture gets beyond the plates.

The Secretary—I would like in this connection to ask if the first tank used had baffle plates? I suppose the theory was that the gas striking these baffle plates would throw the moisture down. What is the theory of the tank without the baffle plates?

Mr. Cutcheon—The theory then, as far as I know, from information received from men who have had more experience in the high pressure business than I have, is that the gas has a chance to rest, that the velocity is decreased, and the gas, moving slowly under compression, drops its moisture.

The Secretary—I have also been told it was the slow-up of the speed that caused the moisture.

Dr. Harrop—I imagine that is all there is to it. If the gas moves with any amount of velocity it will carry moisture in the form of water particles If gas is allowed to pass into a large space, like a tank, say 10 feet or so in diameter, the linear velocity must be very slight, and the water particles have a chance to fall by gravity to the bottom. Of course, the gas as it is taken into the compressors is nearly saturated with water vapor, and after passing through the compressors into the high pressure part of the system, the capacity of the gas for water vapor is decreased, and part of this water vapor necessarily condenses to liquid drops *in situ*—that is in the body of the gas suspended there, and it must have a chance to settle down and stick to the sides of the pipe. I do not think there are any reliable figures on the ability of a moving fluid to carry solid or liquid particles. I remember in college they told us the eroding power of a stream of water was something like the fifth or sixth power of the velocity; that is, a stream of water rushing down the mountain side would carry, not only pebbles or sand, but would carry large rocks, and the greater the velocity of the water the larger the rocks it could carry; and the weight of these rocks would be in proportion to some high power of the velocity. So that necessarily, if the gas passing through the pipe is given a chance to slow down in speed, the liquid particles of water will have a chance to settle to the bottom, stick to the iron surfaces, and, once condensed and falling to the bottom, this water can be taken out by ordinary means.

Mr. Cutcheon—I think myself, from what I have seen of it, the condensation from gas under high pressure is directly proportional to the area of the line or vessel through which it is passing, and the only reason that we get the condensation is the fact of its greater area to the pipe line. That is, if you take the same length of pipe line, equal to the volume of the drip tank, you will get the same amonnt of condensation from it; but you put in a drip tank that is, say, 6 feet in diameter, and if the pipe line is only 4 inches in diameter, naturally you get a great deal more condensation in the tank than you do in the line and if you make that tank large enough you will get all the condensation at that point.

Mr. MacAdam—I am not a high pressure man, but I am in the booster business; therefore, I may say I do not know very much about high pressure. Mr. Cutcheon says that during the winter of 1903–4 he had freeze-ups on the bridge pipes. I have always been ready to believe that the high pressure systems did not carry any moisture from the fact that they did not use drip-pots on the lines. It is a strange thing that a freeze-up occurred on the bridge, when at the same time the services, which are only 18 inches under cover, were not frozen. I think that the weather ought to be sufficient to freeze a service which is covered only about 18 inches, if it will freeze a bridge pipe which is of a much larger capacity. I cannot understand why one should freeze and the other not. At any rate, if the bridge pipe should freeze, I believe there is a way to take care of that, and I would like to ask Mr. Cutcheon the size of the pipe going over the bridge that froze up.

Mr. Cutcheon—Four inches.

Mr. MacAdam—I think the freeze-up could have been avoided probably if the pipes were enlarged just at the point where it froze. It did not freeze up the entire length, but just where it came out of the ground, and there drip-pots should be inserted. If you put drip-pots at either end of your bridge, and keep a little alcohol in them, you will not be troubled with freeze-ups.

Mr. Cutcheon—You have got the low pressure confused with the high. It is not a case of frost but a case of higher condensation—freezing into solid ice. It won't show up in the services beyond the bridge, but it will freeze into solid ice on the bridge.

Mr. MacAdam—You say it froze up on the bridge and not in the service pipe?

Mr. Cutcheon—There are no services on the compressor side of the bridges. The services are on the opposite sides. The condensation is all thrown down on the bridges before it reaches the surfaces.

Mr. MacAdam—That is a different proposition. Now, you talk about the Dresser coupling, as if that were the only thing on earth that man ever invented; but from your own words the Dresser coupling is no good, because it has been demonstrated that anything that insulates a joint is the wrong thing to have. You admit that the current jumping over that insulation has been detrimental to the pipe, and you wish to bond it. Why not do away with the Dresser coupling and get something that is not insulated at all and will serve the purpose just as well? When there is something on the market that is perfectly satisfactory, why boom the inferior Dresser coupling?

Mr. Cutcheon—Well, that is a pretty good point, perhaps the best point you have made. (Laughter) If we can get anything as convenient as the Dresser coupling, which will not act as an insulator, we will be very glad to get it. I would like to know what Mr. MacAdam has that is better? The union is not much better, because you have to use a gasket, and the fitting is not close enough in its connection between the gasket and the pipe to prevent a certain amount of insulation. However, a lead gasket would be better than a paper gasket.

Mr. MacAdam—You do not have to use either one. I have an expansion coupling in use, exposed for 700 feet on a bridge, which never had to be repacked, and it is not insulated.

Mr. Cutcheon—What kind of packing do you use?

Mr. Douglas—Is the packing material a conductor of electricity?

Mr. MacAdam—It is a non-conductor, but the metals come together.

Mr. Cutcheon—Have you any electrolysis on the line?

Mr. MacAdam—No; there is not.

Mr. Cutcheon—You think it would, but wait till you try it—that is what I thought; but when you have a considerable current traveling on the line you will find that which you think is a good conductor is not a good one.

Mr. MacAdam—I do not see how it can be otherwise when it is a solid piece of metal.

Mr. Cutcheon—If it is an expansion joint it cannot be a solid piece of metal; that is the point.

Mr. MacAdam—Well I have probably been tripped up somewhat on that; but I think the getting of two threads together, absolutely tight, comes mighty near being solid, as far as a joint is concerned.

Mr. Cutcheon—An expansion joint is not a case of two threads. You must have a sleeve there, and there you have a certain amount of corrosion and dirt that you cannot avoid—it is very small, but it is enough to cause electrolysis.

Mr. MacAdam—If the metal comes together you are all right. If we had the proportion of trouble in Milwaukee that Mr. Cutcheon has had with his high pressure system, we would be in our graves.

Mr. Cutcheon—You probably know more about the business than we do.

Mr. McAdam—Not a bit.

Mr. Scott—I do not think Mr. Cutcheon's remedy for doing away with these troubles near the power house is very good. If he doubles up his line he doubles the investment, and all he does when he doubles those lines is that he puts off his troubles due to electrolysis for double the time. I think that if you connect the territory to the power house you do not eliminate all your troubles, but you tend to help matters.

Mr. Cutcheon—That doubling of the line is only for a short distance. You will find that bad electrolysis occurs usually in a very short distance. There is some one point where the current leaves the pipe in large quantities, and makes either for the power house or the track, and at that point it is very easy to put in two lines, say for a block. In our line there has been no place where we have had to put it in for a longer distance than a block.

Mr. Scott—But your current divides, half on one line and half on the other. You do not eliminate your trouble from electrolysis. You decrease your results from it one-half, but you double the investment

Mr. Cutcheon—You can insulate one of these lines from the other with a Dresser insulating coupling.

Mr. Scott—That makes no particular difference.

Mr. Cutcheon—That shows all the return current on the one line, and you have the other as a reserve.

Mr. Scott—Then you should connect the non-insulated line to the power house and eliminate the trouble.

Mr. Cutcheon—I imagine that you uphold the practice which is largely in vogue now of bonding the line to the track; is not that your idea?

Mr. Scott—Bonding the territory where the current leaves the pipe to the negative side of the machines.

Mr. Cutcheon—Then are you not inviting that much more current to take to the pipe line? Just as soon as you bond from the pipe line to the track you are inviting that much more current to take to the pipe line, because you are reducing the resistance that much.

Mr. Scott—I hardly agree with you there. We are just bonding it where the current leaves the pipe line; we are not making the pipe line a better return for the circuit.

Mr. Cutcheon—Certainly it makes no difference whether you reduce the resistance between the pipe line and the track or the pipe line and the power house, at the power house end or at the further end. In fact, if you bond your pipe line to the track at the power house end you are going to reduce the resistance a great deal more than if you bond the pipe line to the track at the further end from the power house naturally, because the nearer you come to the power house the greater is the amount of current traveling on the pipe line and on the track.

Mr. Scott—I suppose we could talk about this all day. It is simply a case of the division of return circuits, and I do not think that that adds anything to invite the current to follow the pipe line.

Mr. Eastman—At Eau Claire this summer we crossed the street car line in several places, and wherever we crossed I used some heavy tar and pitch, making an insulating joint of it, so that the current would not either get on or off under the track. I covered the pipe with about 1 or 1½ feet of tar. I do not think we will have any trouble. Of course, we do not know yet, because it has not been in practice long enough.

Dr. Harrop—Mr. Cutcheon is going to insulate that by-pass. Does he think he would not get any electrolysis on the by-pass, as long as it is insulated? Does Mr. Cutcheon know that if one puts a pipe in the ground without any electrical contact whatever in an electrical field one would not get any electrolysis?

Mr. Cutcheon—I do not want you to think that I did not know something about that when I spoke. Mr. Baehr, of St. Louis, has been studying this question quite a little, and he called my attention to that, but I think you will acknowledge there would not be anywhere near as much current traveling on the insulated line as there is on the uninsulated line and, therefore, the life of the insulated line will be a great deal longer and it is used merely as a reserve.

Dr. Harrop—I will acknowledge there will not be as much current traveling along the line of main over the insulated portion as there will be on the uninsulated portion, but I would not care to acknowledge that there will be any less passage of electricity from the pipe to the ground, or from the ground to the pipe in the by-pass, than there will be in the main line. Of course, I understand that that by-pass is put in as a duplicate for emergency. I do not see how, by putting in a double line of pipe, there can be any saving in electrolysis; but I understand that the idea is that both lines will not give out at the same time, and you can cut the part of the main line out which is affected and use the by-pass temporarily, and probably you will find the by-pass intact when you have to use it.

Mr. Cutcheon—I do not suppose anyone will contend there will be as much current following the insulated line as there will be going through the uninsulated line.

Dr. Harrop—No; if all the currents came back from the power house through the pipe line, that would be true. But the biggest part of the current comes through an immense field; the by-pass lies in that field and you will get electrolysis on any iron in that field.

Mr. Cutcheon—Not unless it is conveying current, and this is the line that is conveying current.

Dr. Harrop—How much current will it convey?

Mr. Cutcheon—It will convey as much as the track.

Dr. Harrop—Do you know how much the track conveys?

Mr. Cutcheon—Well, it may be a small percentage of the total, but why should the current in the field through the ground take to the uninsulated line if it will not thereby find an easy course to the power house? Why would not the current in the field take to the uninsulated line and back to the power house?

Dr. Harrop—Some of it will.

Mr. Cutcheon—Why should the current in this field, as you call it, take to the uninsulated line if it cannot find a course through it to the power house?

Mr. Scott—You have not provided a return to the power house. Why will it take your line there?

Mr. Cutcheon—There is always a point where the current leaves the line for the power house, which is the point of least resistance.

Mr. Eastman—If I were doing it I would insulate every joint, and then you would not have any trouble.

Mr. Cutcheon—That is what we started to do, but if you will read the Proceedings of the last meeting of the American Association you will find that that theory was exploded, and our experience has helped to explode it; it won't do.

Mr. Douglas—If you wanted to keep the rain out of a building you would put a good roof on and prevent the rain from coming in; but if you once let the rain get through the roof you will have an awful job to mend that roof. So if your pipe is crossing a point where there is electricity, as Mr. Eastman has said, the better practice is to put the pipe in such condition that the electricity cannot reach it. I understand that right here in the city of Milwaukee they have been working upon these lines, where pipes cross below points where electricity is found, and have adopted the practice of insulating them to keep the electricity off, and that is the simplest method. Mr. Eastman, who was working on a very sandy crossing, flushed his trench full of tar and put sand in until he had about a foot or two of coal tar and sand on his pipes. Thus they were thoroughly and effectively insulated and he had no trouble at all. When the electricity only gets on your pipe how can you get it off unless you put in copper wire to take it away? Otherwise you will have electrolysis sure, whether you take it in the first joint or distribute it over 1,000 feet.

Dr. Harrop—I do not believe any of us know anything about it. (Laughter.)

Mr. Douglas—That is true; but can we not devise some way to keep it off? I understood last year that people in Milwaukee were working on these practical lines, and Mr. Eastman, who caught a point from them, said, I will keep the stuff off. And he uses a 20-foot trench and fills it up with tar and sand, which is a non-conductor, and the electricity won't come near the pipe.

Mr. Scott—What will you do in case you use connections from houses for gas heaters and water heaters?

Mr. Douglas—It is a very difficult question. I suppose the original high pressure gas people talking practically are the Pintsch men. Long before we had any system of distributing what we call high pressure gas the Pintsch gas people had been handling it. They were carrying that gas on cars, as we know, right through 40° below zero temperature with no trouble. These people had substantial experience in this line long before I heard of high pressure distribution, and had built a Pintsch plant in Savannah, Ga., and carried 1-inch gas pipe high pressure for 1½ miles to supply the Georgia Central Railroad. I recall that Mr. Dixon, the engineer, said on this point, "Don't bother about drips, get your pipes tight and you will have no trouble, no matter whether they are near the surface or below the surface, and neither freezing nor thawing nor anything else will trouble them." But as the pressures are being reduced, the tendency is to take up more moisture in the gas, and the first thing which ought to be done when you go into high pressures, is to squeeze juice out, and that squeezes not only the water but the oil out, under those conditions, and you have what the Pintsch gas men call carbon, which is so light that it soon evaporates. That is the first thought. Now, the next thought is, when you put pressure on anything the first result is an increase of temperature, When you use a compression pump for air or anything else you must use a water jacket, because you increase the temperature. Now, if you let the hot air, gas or vapor go through, you will carry along with it the water, unless you give it time to cool down. Is not that a fact? You have got to cool the stuff before you get rid of the water. The next thing is fog. What is fog? Fog is minute particles of water carried along in the air in suspension. Now, make the interior of your pipe a scrubber, and you will get rid of the water. I think it is an interesting question. I have studied it for years, but never had opportunity to work it out practically; but I believe we can get rid of all our frost troubles, because if it is possible to get rid of them on the high pressure system it is possible to get rid of them on the low pressure in the same way. Why not take care of all frost troubles in the works? I am under the impression that the first thing you have there under the compression is a rise of temperature, and under higher pressure the gas will not carry so much moisture, and the moisture in the gas is reduced to a condition of fog. The next thing is to get rid of your fog. After you have got rid of the fog you can send the gas as far as you please, and you will have a lessening of the pressure, which means a tendency of the gas to take up moisture, not to deposit. Is not

that true? Now, can we not do that in a practical way? I think the whole subject is so simple that if I were handling this matter I would put in a large receiver and have arrangements perfected for the scrubbing before the gas reaches the pipes. The question of the size and shape of the surfaces is a matter for experience to develop; but having got your water, which is what you are contending with, into this condition of fog, in finely subdivided form, and having scrubbed it out, you will have no further trouble in distribution; otherwise you will. Just as this fog goes right along until it comes to an extra cool place, when it is in the air, and then it will hang there, as upon a bridge, so it is with the fog in the gas. The whole thing is easy to understand, and if it is understood why there is no trouble about the mechanical means of avoiding the difficulty. I have had this matter under serious consideration for a long time. When I was the superintendent at Minneapolis we were spending a great deal of money on account of these troubles. We had 4,000 or 5,000 street lamps, and the frost trouble incidental to street lamps was very extensive. We were using barrels and barrels of alcohol, and all the means of eradicating the difficulty that we could think of, and yet we simply alleviated the trouble, but did not get rid of the water entirely. Everyone here will appreciate the value of getting rid of all his frost troubles in one operation, right at home. The matter came up to me in regard to a certain city in the last year, whose streets were very rocky and difficult to lay pipes in, and the pipe laying in the outlaying districts had not been done right; it was too expensive to lay them deep, and they had been laid too shallow. How to get rid of the resulting difficulties was a complex problem. But I think, as an engineer. I can remove all of the water from the gas inside of the gas works, and thereby get rid of all this trouble; and I say that the chemist, physicist and engineer together can master that difficulty. It is a matter of detail. The water can be gotten rid of in the works, and also at the same time you will get rid of the hydrocarbon; but not any more than there would be at the tail end of the pipe anyhow. You cannot compress without losing some, you cannot condense without losing some; and whatever the condition is at the tail end of your pipe you might as well face it in the beginning and meet the difficulty.

Mr. Eaton—If you had a town of 5,000 to 10,000 inhabitants, compact, not spread all over God's half acre, would you put in a high pressure system?

Mr. Douglas—Do you mean alone, as a separate installation?

Mr. Eaton—Yes.

Mr. Douglas—No. Two years ago I was approached by a prominent firm in Chicago, who said, "I suppose, Douglas, you are an old-fashioned gas man and, therefore, your prejudices will be thoroughly opposed to a high pressure system." I said I am an old-fashioned gas man, but I hope that I am a gas man, which means that if there is anything new brought before me I try to get rid of any old prejudice which may be lurking around me, and as a result of that conversation I laid out and made an estimate upon a high pressure system for a city of 12,000 or 15,000 inhabitants. The high pressure system went in, and the reason it went in was because the first cost of laying the mains was considerably less than under the low pressure system. In other words, they were trying to keep their capitalization down. But after the mains are laid it is necessary to put in services, and then you must put in a governor, and that extra cost must be added; and after you are through with all your governor system, and the various "trinkum-trankums" that you must put in, the practical result in the long run is that it will not cost very much more to put in a much more economical plant under the low pressure system. But if you are dealing with another condition—namely, that of a central station, and are going to run long distances, unquestionably a high pressure distribution to the long distances—and incidentally to small towns of 3,000 or 4,000 inhabitants along the road, may be employed to great advantage. But if you reach a place of 7,000 or 8,000 people, even then I think it would be better to put in one governor and reduce it to a low pressure system, and handle everything from something that you can control instead of trying to handle the plant over the whole town. And the difference between the cost of the larger pipes and larger services would be very little over the cost of the smaller pipes and the extra care, and leakages and condensations and difficulties, and every service having a governor on requiring attention, so that in the long run you had better put that one governor in to take care of your towns of 5,000 to 7,000 inhabitants. For high pressures for such sized towns I see numerous disadvantages and not a single advantage.

Dr. Harrop—I did not intend to engage in this discussion, but since Mr. Douglas has got into it, I suppose I will have to.

Mr. Douglas—The President asked me to come here and wake you up. (Great laughter.)

Dr. Harrop—We always recognize Mr. Douglas a good thing. I would like to ask him did he mean in speaking of removing moisture from the gas that he would do it with a low or high pressure system?

Mr. Douglas—I do not quite understand. I was discussing this from a high pressure standpoint, primarily.

Dr. Harrop—Mr. Douglas made the statement that it was possible to take all the water out of the gas at the works, and that it was up to the engineer to do it in a practical way. Did he mean that that was applicable to a low pressure supplied town?

Mr. Douglas—I meant that we are living in a cold country now; and understand there are two factors important to the removal of moisture from gases; namely, temperature and pressure. Am I right?

Dr. Harrop—Correct.

Mr. Douglas—We were dealing just then with pressure, and I stated, that increased pressure for the time being made increased temperature. Is that not correct?

Dr. Harrop—Yes.

Mr. Douglas—The increased temperature and pressure, according to my theory (I have not gone inside of the works to look at it) brings that water out of the gas—not all of it, but dependent upon the temperatures and pressures absolutely—the relative proportion of water to be removed is dependent upon those things to get it all out. I don't know what pressure and temperature you would have to have. The next thing is, having got it in the form of a fog, to get rid of it by scrubbing. Then how you propose to handle it is not pertinent to the paper.

Dr. Harrop—It is pertinent to the statement you made.

Mr. Douglas—Yes. If we have a condition of below-zero temperature in this city or any other place, certainly our gas works are exposed to the same condition. My suggestion would be to put your cooler out there, exposed to the air, and it will bring your gas down immediately to the zero temperature and remove your water there. If you will shove that gas at that temperature into the ground, it will rise in temperature and you have no frost trouble as the result because the conditions are all towards not depositing but taking up moisture, and especially if there is a governor between your holder and your distribution. In other words, if your pressure where you are putting your condenser in is greater than the air pressure.

Dr. Harrop—As I understand your position now, it is that even with the low pressure system such as most cities have, you would use the possibility of condensing the gas in the works by means of the cold temperature of the day, and removing most of the moisture and turning the gas into the mains where it will rise perhaps a little in temperature and would not deposit any more moisture either as water or frost. I would like to ask Mr. Douglas if he read Mr. Butterworth's paper on the desiccation of gas?

Mr. Douglas—I did not.

Dr. Harrop—Mr. Butterworth has collected all the known means of desiccating gas. He presented them in their order and pointed out some of the merits and failings of each, and he argued, as Mr. Douglas has, that it would be an advisable thing to desiccate the gas by one means or another before it goes into the street, and he rather favored Mr. Douglas's idea that the temperature of the day, the cold weather itself, should be utilized to precipitate the moisture from the gas before it goes into the street. It looks good. It is all right theoretically, and I rather believed in it myself until the other day, when a certain gas man and I spent a pleasant 15 minutes figuring the matter over. Taking a certain city where the conditions were known, where we knew the temperature of the gas going into the street, and could calculate very accurately how many gallons of water went out into the street with the gas in 24 hours, we knew how many gallons of water were being pumped out of the mains in the city every 24 hours, and found that three times as much water was being pumped out of the mains every day by means of the drip pump as was going into the mains from the holder in the same length of time.

Mr. Douglas—Do you mean to say that three times more water came out of the mains than went in?

Dr. Harrop—Yes.

Mr. Douglas—How did it get there? There must have been a leakage.

Dr. Harrop—Many of the mains were under water, and the water must get in through the leaks; so that, while the idea is beautiful and works out perfectly in theory, in one city at least, it is not practical.

Mr. Douglas—That would be the exception; will you not admit that?

Dr. Harrop—I doubt it very much. I think you will find in most cities that the mains for some distance lie under water, and if it is an ordinary city, with an ordinary distribution system, the water pressure on the outside of the main will be greater than the gas pressure on the

inside, so that more water will go into the mains than the gas takes in; and even if you remove all the water from the gas before you send the gas into the mains enough water will force itself into the mains from the outside to resaturate the gas.

Mr. Douglas—Possibly that is the condition existing.

Dr. Harrop—That is something that we had not heretofore noted, but the fact in the particular case cited proved that it was so there, and the probability is that the same condition will be found almost everywhere. I am glad Mr. Douglas has carried the discussion away from electrolysis, and I would like to say one word on the general subject of Mr. Cutcheon's paper. He has taken it for granted that we all understand that the smaller investment in mains makes a high pressure system preferable. He has given figures on the cost of pumping, and has told us something about the decrease in candle power coming from high pressure. The bearing of the evidence seems to be in favor of the high pressure pipe for delivering gas over long distances. I would like to ask Mr. Cutcheon what he knows about leakage. Does he himself know how much of the gas that he puts into his high pressure system comes out? Does he meter his gas when he makes it and compare that with the totals of his consumers' meters; and has he any systematic way of checking up his distribution system and finding out just how much it is leaking? There might be 10,000 leaks, each one passing a fractional foot of gas, and yet they would sum up a great deal; and a great number of very small leaks under a pressure of 15 to 30 pounds will mean a great loss of gas in 24 hours.

Mr. Cutcheon—I did not intend my paper to be one of scientific research, but rather an account of our experiences. If the line is properly laid it ought to be perfectly tight. In fact Mr. Goodnow says that his loss between Waukegan and Highland Park is only about 2 per cent.

Mr. Douglas—All pipes ought to be tight.

Mr. Cutcheon—Yes; but a screw joint is tighter than a lead pipe joint. Our losses last month were a fraction over 12 per cent., which I think is not much higher than the average loss on the cast iron laid joint lines. We meter all our gas before it reaches the compressor, and of course we subtract the total of the consumers' meters from that.

The Secretary—I would like to ask Mr. Mainland where this high pressure installation of his is located?

Mr. Mainland—We have a high pressure system at Green Bay, Wis., and also at Monmouth, Ills., that we put in this fall, and we are building another line now.

The Secretary—Is this high pressure line at Green Bay used as a booster system?

Mr. Mainland—Entirely, at the present time.

The Secretary—Figuring interest on the cost of installation, and adding the cost of pumping the gas, how do you find it compares for one year as against the interest on the cost of pipes sufficiently large to accomplish the same work on a low pressure system without the cost of pumping?

Mr. Mainland—We have not operated for a year.

The Secretary—Did you make any calculations to determine which you should put in—the small high pressure line or the large low pressure line?

Mr. Mainland—Well, we made calculations; but I have not anything to offer on that subject.

The Secretary—That is quite interesting to me at present.

Mr. Brown—We have not had any experience with high pressure, properly speaking. In our case, which is a very special one, we had a distribution system which was badly outgrown, and a great deal of permanent pavement in the section of the town where the large mains would have to be laid, and where the telephone company, the water board and gas company, the street car railway and the sewers combined to make it very difficult indeed to lay large mains; but we are saving on some of our lines as much as 6 to 1 by using a booster system. In all cases we save at least half the cost. But I will add to that, we did not pump all our gas, which makes a very material difference. Roughly speaking, about $\frac{1}{5}$ of our gas is pumped.

Mr. Cutcheon—Do you find fewer freezeups in the districts fed from the booster line than in the district fed from the low pressure main?

Mr. Brown—Our district entire is fed by the booster system; but there is no reason why there should be any difference whatever, because we have an excess of moisture in our mains far beyond that required to saturate the gas at the average temperature at which it reaches the service and the consumer, and while there may be isolated districts in the towns where the gas is dry, and where the gas would reach the booster system with slightly less moisture on account of the increased pressure, the difference is so small that we could not detect it in any way.

Mr. Cutcheon—I see the point; but I wanted to state the fact that we have not had one freezeup at Neenah or Menasha this winter.

Dr. Harrop—I would like to add one point bearing on something that Mr. Douglas has said. The extraction of moisture from gas by compression is a feasible practice where you are carrying a high pressure, and there is no chance of surface water leaking into the mains; and the suggestion of Mr. Douglas is practical on a high pressure system, and Mr. Douglas suggested that the high pressure concern should compress its gas first, then should cool it, scrub it and turn it loose into its distribution system dry. And that is what any high pressure distributing company should do, it seems to me; and I have often wondered why they do not do it. But, as far as I know, all the concerns which distribute gas under high pressure allow the gas to take care of itself. They do have some cooling arrangement in their compressors, which is only partially effective, and any excess of heat left in the gas after leaving the compressors is allowed to cool itself, and the gas will still further decrease its capacity for moisture on cooling, and then it carries a large part of this moisture in the form of a fog long distances in the pipe. It is likely taken out most in the first drip, and less in the second drip, but there is no reason why the high pressure concerns should not remove all the moisture from the gas at its compressor, and then we would have dry gas that would not freeze.

Mr. Brown—The average high pressure system does what Dr. Harrop advocates. The scrubbing which Mr. Douglas advocates also takes place by the friction against the walls of the pipe. As a matter of fact the experience with high pressure distribution is that the gas is very thoroughly dried within a reasonable distance from the works, and practically all the moisture found in the mains is taken off in the first or second drip.

Dr. Harrop—Then the bridge that Mr. Cutcheon spoke of as freezing up, was wtihin a "reasonable distance" of the works.

Mr. Cutcheon—Yes; it was within 500 feet.

Mr. Douglas—It was a pity to make the bridge do the work that should have been done in the works?

Mr. Cutcheon—That is not exactly a fair statement. Mr. Goodnow has no bridges, and he removes all the water from the gas, within 1,000 feet from the compressors.

The President-elect—In the absence of the President, and in his behalf, I extend to Mr. Cutcheon our thanks for the very interesting paper he has submitted.

(To be Continued.)

Vertical Retorts at Berlin.

The *Gas World* says that in the latter half of last year the Imperial Continental Gas Association were experimenting with vertical retorts at their new Mariendorf works at Berlin, with the object, if the experiments proved satisfactory, of fitting a new retort house there with this type of retort. But at the half-yearly meeting of the Association in November last it was reported that the results had not been such as to justify the erection of the large installation contemplated, and, consequently, it was decided to equip the new house with inclined retorts. The trial of the vertical retorts was, however, continued; with the result that Mr. E. Körting, the Association's chief engineer at Berlin, was able to report in January last that normal results were being obtained from the setting. The main difficulty, as was explained in the *Gas World* for the 13th January last, was with the heating of the length of retort that had been adopted, namely, 5 meters, or about 16 feet 5 inches. Modifications in the furnace overcame this difficulty; and so satisfied are Mr. Körting and the directors with the results now being obtained from the experimental plant at Mariendorf that it has been decided to proceed with the erection of a considerable installation of similar vertical retorts at the Association's Oberspree works, which supply a rapidly growing industrial area on both banks of the Spree, to the southeast of the city of Berlin. The demand upon this works is growing at a rapid rate, and it is calculated that an increase of 30 per cent. will have to be provided for this year. At present there are 72 horizontal retorts at the Oberspree works, capable, if all were under fire, of producing 570,000 cubic feet of gas per 24 hours, which is considerably below the estimated maximum demand for the current year.

Under these circumstances, it has been decided to build a new retort house and to immediately fit the first section of it with 48 vertical retorts 5 meters long. The house has been designed to take in all 16 beds of retorts, but it is expected that, for this year at least, only 4 beds will be required. The size of the Oberspree works is such as will per-

mit the use of vertical retorts exclusively for the greater part of the year; and hence a favorable opportunity will present itself for studying closely the working of this type of retort.

The Teaching of Physics.

Prof. John Perry, F.R S , the new President of the London Physical Society, in his inaugural address said that in the early days of the Society, when he had the honor of acting as a Secretary, and when Guthrie and Foster, Kelvin and Fitzgerald were Presidents, no presidential addresses were delivered, and he questioned whether the Society was not overdoing the business of requiring general addresses, which almost always have as their theme the progress of science. Seldom did we find in such addresses new accounts of important original work, and he felt the inappropriateness of such an address in speaking before a Society whose proceedings were more intense with original work of the best kind than any other society known to him with the exception of the Royal Society. He thought that every young reader of a paper before a scientific society made the mistake of assuming that his audience knew a great deal of the subject so familiar to himself, and hence his paper was not understood. Writers of books on physics assume their readers to be all truly logical students; they use words properly in a technical sense and forget that many of their readers may use them in the newspaper writer's sense. For example, take the expression "adiabatic expansion." There are people who insist on finding that Rankine, Maxwell and all others of our most exact writers are not only inconsistent with one another in the use of the expression, but that each is inconsistent with himself. If a portion of fluid expands slowly without gain or loss of heat, we know the way in which its p, v and t alter as it changes state. This was originally called "adiabatic expansion," and the term has become a technical term for that kind of alteration of p, v and t, however it may occur. Steam or air may be throttled through a non-conducting reducing valve, but the expansion is not adiabatic, although there is no gain or loss of heat. Steam or air passing along a pipe with friction, if it can only be made to lose heat through the metal of the pipe at exactly the proper rate at every place, is expanding adiabatically. When it is assumed that steam or air flows without friction from a vessel through an orifice, it is said that the expansion is adiabatic although it is rapid.

Referring to the teaching of physics to students entering upon the engineering profession, the President remarked that such teaching was nearly always slipshod. Many men enter a science college at the age of 18 or more, knowing nothing of physical science. In the case of a great percentage of such men it is impossible that they should acquire the scientific habit of thought. It is because so much of this kind of material is dealt with that much of our teaching is slipshod. Every pupil entering a science college ought to have been experimenting and working graphically and numerically on physical science problems from a very early age, and then our science classes would deal with them in a scientific way.

The causes of the unfitness of the average student are two; one that his instincts and habits of thought were not trained from early youth; the others that his teachers in science colleges have absurd and uninteresting courses of study for him. In physics we are dealing with ideas which are not familiar to young students, ideas which can only become familiar in the laboratory. For example, such a simple mathematical idea as that of a decimal cannot be given in the elementary schools in less than 5 or 6 years, whereas 1 week of weighing and measuring would give young children familiarity and clear ideas about decimals. Numerous examples could be given to prove that the principles of physics cannot be understood unless there has been early experimental training, and this is the reason why the professors of science in colleges of university rank and the professors in technical colleges obtain such poor reward for their labor.

Referring to the many hundreds who every year take science degrees at the universities, and the thousands who pass the London University matriculation examination, Prof. Perry remarked that if that was the standard of excellence of those present, his address could serve no useful purpose. Nothing ought to be compulsory in schools except the study of English and of natural science. The object of a matriculation examination is to test whether a student entering a college will be able to benefit by the course of study there. The only language which ought to be compulsory in the science department of a university is English. A professor of science ought to be allowed to teach his students in the way that seems best to him and he should examine the students himself. Hedge him round with rules and regulations framed by boards of studies; tie him down to a syllabus, and the work he will do might be much better, certainly much more cheaply, done by a grinder at low wages. There is no one general elementary course in physics which all students ought to take; neither by their previous training, nor from the uses which they will make of the principles of physics, are they fit to be taught together. What is wanted is more classes, more rooms and more teachers.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Godfrey L. Cabot, writing from Boston, Mass., under date of the 1st inst., says:

To the Editors American Gas Light Journal: Referring to the very interesting paper on "The Limitation of High Pressure Gas Transmission," by Mr. W. H. Y. Webber, in your issue of January 29th, page 186, permit me to point out that friction is supposed to increase with the square of the velocity. If, for instance, you double the flow you increase fourfold the friction and consequent head required to drive gas through a given length of pipe. It is not the same if initial pressure is maintained at 50 pounds and the other end pressure 45 pounds, as if the initial pressure was 5 pounds, and the delivery at atmospheric pressure, owing to the fact that, in the former instance, the amount of gas in a given volume is more than 3 times as much, and you will undoubtedly have a greater weight of gas pass through the pipe for this reason with the high pressures than with the lower; about twice as much. It is a fact, corroborated by numerous instances, both with illuminating gas and with natural gas, that fuel gases are all more compressible than the theory, the result of which is that increasing the pressure increases the flow much more than it would with a theoretically perfect gas, and accordingly high pressure gas plants have proven much more efficient than the theorists expected. Mr. Webber seems to imply that there will come a point where you cannot increase the velocity of the flow of gas, no matter what pressure you put upon it. This is pure theory. Far be it from me to deny that there may be such a point, but it has not yet been reached in practice. He also ridicules the idea of a 4-inch pipe pouring out gas at the rate of 478,000 cubic feet an hour. I have seen a 4-inch pipe pouring out gas at a more rapid rate than this. The said pipe was about 1,700 feet long, the bottom of it being in the bottom of the earth, and I know not what was the pressure at the bottom, but the open pressure was 35 pounds to the square inch. If the pipe had been a mile long I am satisfied that the rock pressure maintained in some of our gas wells would still have been sufficient to give this astonishing output at the orifice of the pipe."

The Cincinnati *Tribune* reports that a large majority of the stockholders of the Cincinnati Gas and Electric Company voted to confirm the action of the Company's Directors in recommending that the capital stock of the Company be increased from $31,000,000 to 36,000,000 for the purpose of piping natural gas into the city. The confirmation of the step is to be followed by the issue of the additional stock, and the Directors will determine at a special meeting, to be held in a few days, as to whether the stock shall be placed on the market or be issued to the present stockholders for their subscription at par. The meeting was largely attended by large and small stockholders, among whom were a number of women. A total of 222,754 shares were voted in favor of the increase, while 453 shares were voted against the proposition.

The Gas and Electric Development Company, of Philadelphia and New York, reports the sale of the Morris (Ills.) Gas and Fuel Company to Mr. Burdette L. Bowne, who formerly owned the works at Marshall, Mich. Mr. Bowne took charge of the Morris works on the 1st inst., and he proposes to make extensive improvements thereon this spring.

A correspondent in Harrisburg, Pa., forwards the following under date of the 2d inst.: "The Peoples Gas Company, of Pottsville, Pa., has been purchased by the American Gas Company, of Philadelphia, which will make continuous the work of improvement that was commenced when the plant went into the control of Mr. Francis S. McIlhenny and associates. There will be no change in the working force, Mr. S. L. Cramer being retained as local manager. It is the intention of the Company to extend the mains to the borough limits on East High street and on York street, and to lay mains through the Queen street addition, VanBuskirk's addition, on Lincoln avenue and Oak street and wherever

consumers desire it. The output of the gas plant has been largely increased by the Peoples Company."

MR. F. H. SHELTON, writing to us from Philadelphia under date of the 7th inst. says: "Gas men had better look out for a man giving the name of A. L. Whittel. He has 'worked' several gas men to my knowledge, and is, I think, a professional dead-beat, entirely undeserving of any sympathy or assistance. He told a hard luck story to me, perhaps a year ago, and received a little assistance, being given the benefit of the doubt. He returned a few months later with an even better story, involving a wife and hungry children, and I decided to give him an opportunity to work and get on his feet if he showed any capacity whatever. He reported at the works to which I sent him, 'separated' the Superintendent from $4, and never returned. I now hear of him in the West, around St. Louis, quoting me as a reference, and, I believe, Mr. Fred. Bredel. I further understand that the latter is somewhat anxious to meet him. Whittel is a German, of middle age, of shabby appearance, knows enough about gas and chemistry to easily deceive some one friendly disposed; but in my opinion he does not want work, and should be kicked out of any office into which he enters and is identified. I publish this that sympathetic managers may not bestow their charity on unscrupulous and misrepresenting individuals if they know it."

MR. A. R. MARVIN, of Buffalo, N. Y., writing to the JOURNAL under date of March 2d, incloses the following mention of the death of Mr. John H. Cowing: "Mr. John H. Cowing, for over 30 years a resident of Buffalo, N. Y., died suddenly at Riverside, Cal., the morning of the 23d ult. He had been ill for several years, and some weeks ago he went to Southern California with his brother, Mr. James R. Cowing, in the hope that a sojourn there would be beneficial. He was born in Brooklyn, N. Y., December 20, 1846, and was the son of James A. and Julia Radcliffe Cowing, who formerly lived in Buffalo. His preliminary education was received in Brooklyn and he subsequently entered Williams College, graduating in the Class of 1867. After his graduating he entered the banking house of Tasker, Marvin & Co., remaining there until he went to Buffalo to represent the interests of that house and certain Brooklyn interests largely involved in the fortunes of the Buffalo Mutual Gas Light Company, a concern that was started in opposition to the old Buffalo Gas Company. He was chosen Vice-President and Manager thereof and continued in such relations until the merger of the Buffalo Companies was completed in 1897. He continued as General Manager of the Consolidated Companies until obliged to relinquish active business duties because of failing health. He was prominent in society and club life in Buffalo, and was foremost in many movements for the civic good of that city. He was for years a director in the Buffalo Club, a trustee of the Charity Organization Society and of the Fine Arts Academy and for many years a leader in the Civil Service Reform Association. He always kept up a keen interest in his old college fraternity, Kappa Alpha. He was also a member of the Saturn Club, and of the University Club, of New York."

THE proprietors of the Sedalia (Mo.) Company, having settled their differences with the city, have arranged for the construction of a new works, which are to be in every respect up-to-date. The plans for the same have been designed by Mr. Roger W. Polk, of St. Louis, who will likely supervise the construction. The scheme calls for 4 full-depth benches of the Laclede Manufacturing Company's design, with washing, scrubbing and condensing apparatus up to a per diem delivery of 250,000 cubic feet. The original scheme included a 6-foot water gas set, but that will not be installed at present. The holder, calculated to retain 150,000 cubic feet, is to rest in a steel tank, and it is planned to put down about 6 miles of pipe, ranging between 10 inches and 4 inches in diameter.

WE are indebted to Mr. John J. Gribbel, of the firm of John J. Griffin & Company, of Philadelphia, for a brochure reprinted from the New York *World*, dated January 28, 1906, which has to do with prepayment meters from a popular point of view. It is well worth reading. Send to him for a copy, even if it has been widely distributed.

THE gas rate in San Francisco for the ensuing fiscal year has been put at 85 cents per 1,000 cubic feet instead of 75 cents, which the Board of Supervisors originally threatened.

THE articles of incorporation of the Capital City Gas Company, of Des Moines, Ia., have been amended. The name of the concern is now the Des Moines Gas Light Company, and its capital is $2,500,000.

THE Stacey Manufacturing Company, of Cincinnati, O., has been awarded a contract for the construction of a holder on the municipal gas plant at Duluth, Minn. It is calculated to retain 500,000 cubic feet, is to rest in a steel tank, and is to have 3 lifts.

INFORMATION that seems reliable comes to us from Honolulu that Mr. W. J. Logan, of the Logan Iron Works, who stopped there recently on his way to Japan, believes that some of the sights there to be seen are worth seeing.

WE are indebted to Mr. W. W. Seymour for the new schedule of rates which went into effect the 1st inst., as per the tables printed by the Tacoma (Wash.) Gas and Electric Company: For each 1,000 feet under 10,000 cubic feet, $1.50 gross, $1.45 net; to large consumers: For each additional 1,000 feet above 10,000 feet and up to 20,000, $1.45 gross, $1.30 net; for each 1,000 feet above 20,000 and under 30,000, $1.40 gross, $1.20 net; for each 1,000 feet above 30,000 and under 50,000, $1.20 gross, $1 net; for each additional 1,000 feet over 50,000 cubic feet, $1 10 gross, 90 cents net. The Company will expend $75,000 this season on betterments.

"W. P. S.," writing from Baltimore, Md., under date of the 5th inst., incloses the following: "In the construction and equipment of the new building recently erected at the northwest corner of Lexington and Liberty streets by the Consolidated Gas Company nothing has been omitted that would interest and attract the woman with the care of a home on her shoulders. Indeed, it would appear that woman's comfort was the paramount thought in the minds of the designer and constructor. Although the building is thoroughly modern and no detail that would tend toward facilitating business has been overlooked, the 2 rooms, a reception room and a kitchen, designed exclusively for the comfort and edification of women visitors will, when completed, be especially unique and will be a great center of attraction for curious femininity. As these apartments will be located in the rear of the first floor of the building at 104 West Lexington street they will not be completed until about April 1. This building, although a part of the Gas Company's structure, was occupied by the Company during the erection of the main building and is not yet ready to be opened to the public. The reception room, the dimensions of which are 12 by 20 feet, is to the rear of the lamp display room and will be handsomely furnished with massive leather-covered rockers, a leather couch, a large reading table in the center of the room and a half dozen small writing desks. A complete assortment of all the latest magazines and daily papers will always be found upon the table and a full stock of writing paraphernalia at the desks. A maid will be in attendance to see to the comforts and wants of the guests. Adjoining the reception room is the kitchen. This apartment, 12 by 16 feet, will be equipped with all the latest kitchen utensils that tend to eliminate the labor of housework, and will prove especially interesting to all women who have the care of a home. Occupying about 11 feet along one side of the room will be always in operation an elevated range, a griddle plate, a waffle stove, a vertical boiler and an oven and plate warmer. The last mentioned is a new device to most housewives and is used to warm plates before placing them on the table for use. Another new and novel device that will be in operation is a furnace water heater. On one side of the room will be a radiator, the size to be determined by the dimensions of the room, filled with hot water which has passed through a waterback installed in the furnace in the cellar. From the radiator the water will pass into the boiler or hot water tank, from which it is drawn when needed. The object of this device is to eliminate the necessity of a kitchen range or stove in winter weather. The room will be heated by the radiator and the hot water obtained from the furnace. Several first-class cooks will always be in service in the kitchen preparing dainties for the guests when they visit that department. While the new building is modern in every particular, it is needless to say that it is lighted throughout by gas rather than electricity. The first floor is designed as an office, where a number of clerks are employed and deal directly with patrons. In case reference to a record of any kind is required an automatic tube operates between the first, second and third floors. The second floor is utilized by the bookkeepers, the auditing department and the secretary's office. On the third floor are the offices of the manager, consulting engineer and the agents. The engineering department, the telephone exchange and the stenographers are on the fourth floor, and the directors' rooms, committee rooms and a dining room and kitchen for the convenience of employees are on the fifth floor. The trimmings are all of Cabanassa marble and tiled flooring is used throughout the building."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. H. SANDERSON,
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MONDAY, MARCH 12, 1906.

The Market for Gas Securities.

The Agnew Assembly bill declaring that the gas rate in New York city proper shall be 80 cents per 1,000 cubic feet, has been accepted by the Senate, and it is likely the Mayor will say it is all right, which means that Governor Higgins will also say "yes." Between them and the Commission it is. The closing price to-day (Friday) was about as it was last week. Brooklyn Union is on a level with Consolidated. It should be 10 points higher.

The cheapest thing on the list is Peoples, of Chicago, with Baltimore a close second.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 12.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	155⅝	155⅞
Central Union, Bonds, 5's	3,000,000	1,000	108	110
Equitable Bonds, 6's	1,000,000	1,000	..	105
" 1st Con. 5's	2,300,000	1 000	118	120
Mutual	3,500,000	100	275	290
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	107	109
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union, Bonds, 5's.	1,250,000	1,000	105	107
New York and East River.. Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106¼	106¾
tandard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
Bonds, 1st Mortgage, 5's	1,500,000	1,000	111	114
Yonkers	299,550	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	148	155
" " Bonds (5's)	15 000,000	1,000	112	113
Bay State	50,000,000	50	⅝	..
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
d " " "	3,000,000	1,000	47¼	50
Buffalo City Gas Co.	5,500,000	100	10	12
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co	29,500,000	100	103¾	104
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	85	86½
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	351,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
For Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	110	110½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100		
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	108½	109
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	96¼	96¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	58¼	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	98	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,500,000	20	300	303¾
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del	600,000	50	230	..

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NOTICE!

PLEASE read the advertisement of the Empire Gas Improvement and Construction Company, on page 65. This Company employs only high-priced and quick-working mechanics, and all its work is guaranteed to be strictly first class, and will be finished at time specified. A. M. SUTHERLAND,
1545-eot. tf 49 Wall Street.

Position Wanted

As Manager or Superintendent by a Practical Gas and Electrical Engineer.

Nine years' successful operation of present property; 15 years' experience. Will be open for engagement April 1, 1906. Best of references from present company.
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By a young man having 10 years' experience in the manufacture, distribution, construction and management of two gas companies. Have been successful in developing business and reducing operating costs. Can guarantee great improvement in the management of a company which has not been paying satisfactory dividends.

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One for gas and electric light and one for gas alone. Answer, stating experience and salary expected.
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A Man as Assistant to General Manager of an Electric and Gas Company,

In a city of about 200,000 inhabitants. Must be competent to assume the duties and position of general manager at such time as he has become thoroughly familiar with the property and its operation, and gained a knowledge of its policy, and satisfactorily demonstrated his ability.

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WANTED,

A LIVE SOLICITOR,

One who can not only talk gas and electricity, but one who can secure orders. Apply in writing to WM. MORGAN LEWIS,
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WANTED,

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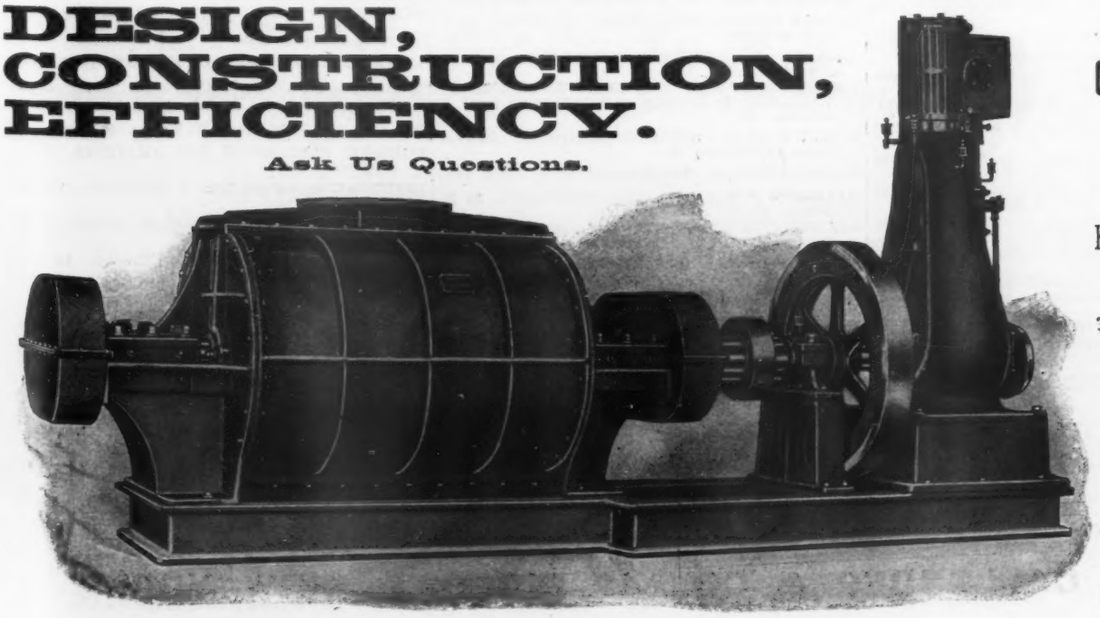

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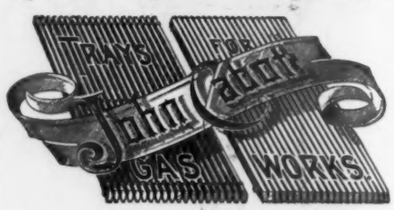

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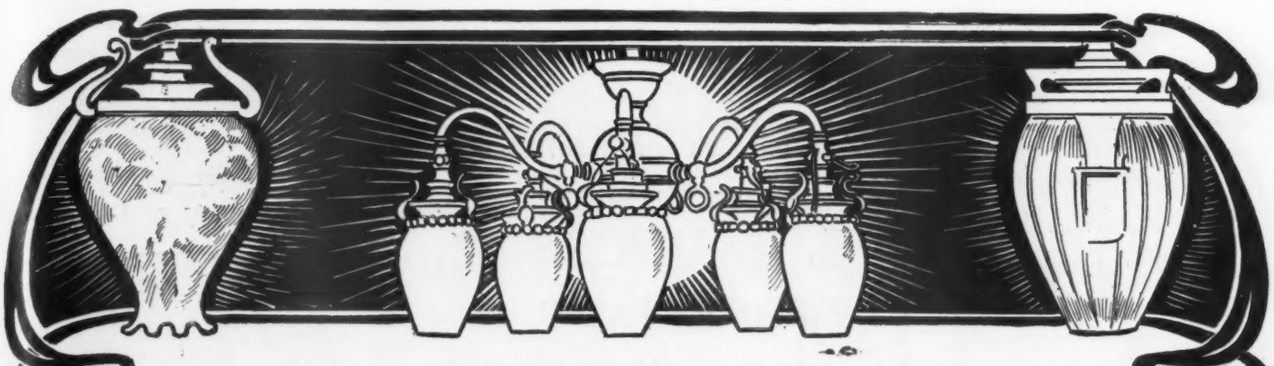

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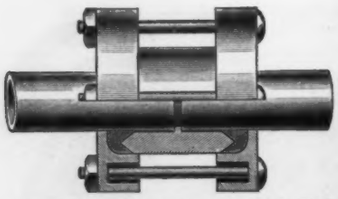

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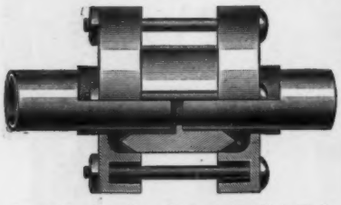

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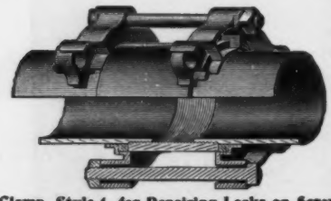

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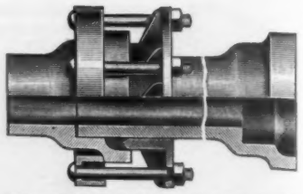

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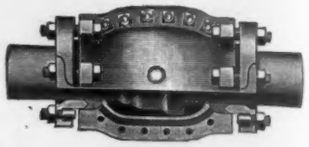

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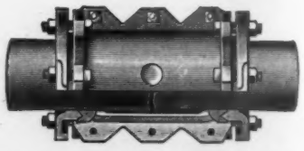

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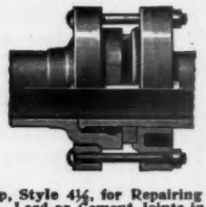

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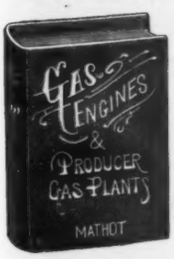

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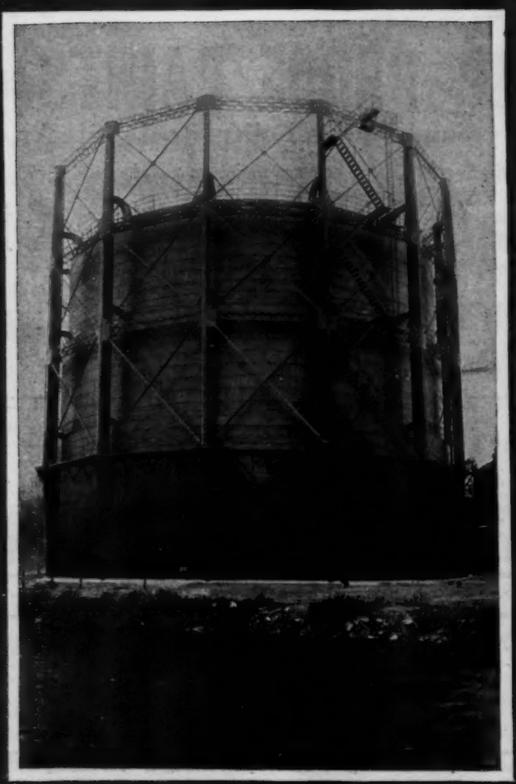

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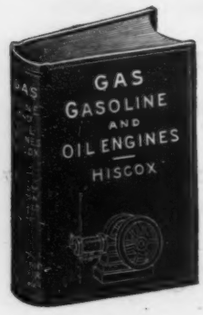

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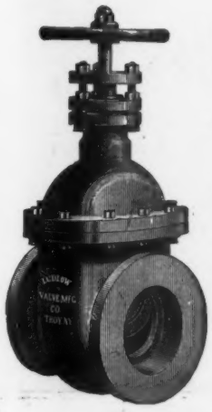

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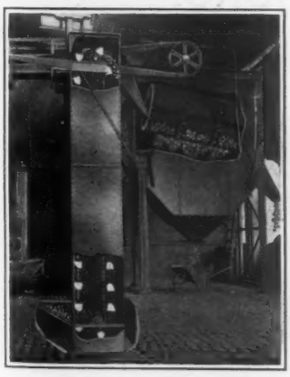


Reclaiming Coke from Ashes.

The Link-Belt elevating, conveying and screening outfit here shown is in use by the Mutual Gas Light Co., New York City. Write to us for full description of this and other Link-Belt machinery successfully applied to gas house use.

THE LINK-BELT ENGINEERING CO.,

PHILADELPHIA.

NEW YORK: 49 Dey St. PITTSBURGH: Park Building. CHICAGO: The Link-Belt Machinery Co.

Cox's High Pressure Fluid Discharge Computer.

This Computer solves the following formula, which is applicable to Gas, Air and other elastic fluids, flowing through long pipes with high initial pressures:

Discharge in cubic feet per hour at atmospheric pressure $= 33.3 \sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{L \times w}}$

Where

d = diameter of pipe in inches,

p_1 = absolute initial pressure in pounds per square inch,

p_2 = absolute terminal pressure in pounds per square inch,

L = length of pipe in miles,

w = specific gravity of the fluid when air = 1.

To Find the Discharge from a Pipe and the Required Size of Pipe.

(1.) Set the specific gravity of the fluid opposite the length of pipe;

(2.) Bring the DIFFERENCE of the initial and terminal gauge pressures opposite the SUM of the initial and terminal gauge pressures;

(3.) Opposite any diameter of pipe will now be found the discharge in cubic feet per hour at atmospheric pressure; and

(4.) Opposite any desired discharge will also be found the required diameter of pipe.

Price of the Computers, in Cloth Case, 6½ x 8 inches, $5 Each, Net.

For Sale by

A. M. CALLENDER & CO., 42 Pine Street, New York City.

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO.,

Contractors for the Installation of

COMPLETE GAS WORKS OR ANY PART THEREOF, INCLUDING

Houses, specially designed for room and economy.
Holders of any desired capacity, with or without Steel Tank.
Coal Gas Benches of every approved setting.

Standard Lowe Double Superheater Water Gas Sets.
Lowe-Sutherland Double Superheater Water Gas Sets.

Boilers, Engines, Blowers, Coal Elevators, Purifying Boxes, Tar Extractors, Scrubbers, Condensers, Exhausters, Station Meters, Street Mains and Governors.

Where necessary we give Bond in any required sum to guarantee speedy *completion* and *results.*

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO., 49 Wall St., New York.

NEW DESIGNS FOR THE NEW SEASON.

Is it of interest to you to know that your dip pipes are all sealed absolutely the same?
That you can lock up your air slides and put the key in your pocket?
That your retorts carry none of the weight of your mouthpieces?
These advantages and many more are embodied in our

BENCH IRONWORK.

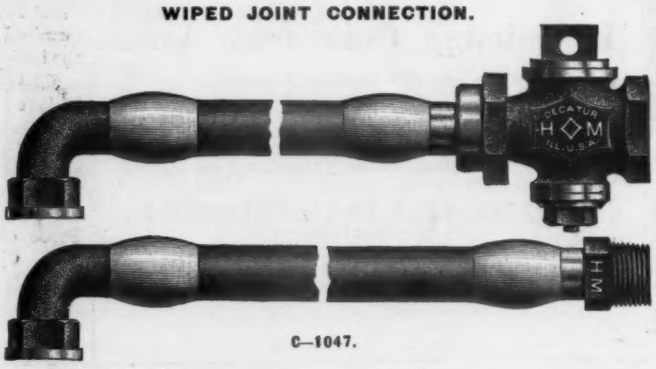
LLOYD CONSTRUCTION COMPANY,

DETROIT, MICH.

Western Agents
BARTLETT, HAYWARD & CO., Baltimore, Md.

MUELLER GAS METER CONNECTIONS.

WIPED JOINT CONNECTION.



C—1047.

When a joint is being wiped the tin and lead in the solder have a tendency to separate, the tin going to the bottom; and unless the solder is skilfully handled there will not be enough tin at some points to insure a strong joint.

The long experience of the men who make Mueller Wiped Joint Meter Connections have given them a thorough understanding of this tendency and a knowledge of how to work the solder to overcome it. Every part of the joint has the right proportion of lead and tin to insure strength.

Mueller Wiped Joint Meter Connections are made with regular full length fittings and the pipe slightly swedged to accommodate them. They are made in 270 sizes and specifications. The connections illustrated have a male soldering nipple and union meter cock on one end and bent meter couplings on the other.

Each set of connections is carefully inspected and assembled, is given a 75-pound hydraulic pressure test, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make tapping machines and ground key cocks for gas works' use. Catalogs upon application.

Works and General Offices
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

H. MUELLER MFG. CO.

Eastern Division
NEW YORK, N. Y., U. S. A.
254-258 Canal St. (Cor. Elm)

ROOTS' GAS EXHAUSTERS.

Installation showing our latest improved machines, with flexible rope coupling, for large units.

SEND FOR CATALOGUE.

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Building.

GOLD MEDAL AT ST. LOUIS, 1904.

TWENTIETH SERIES

ARGAND
GAS RANGE.

A CAST FRONT RANGE.

Beautifully Ornamented.
All Ovens 12 inches high.
Centrifugal Burners.
Extra heavy ¾-inch Gas Rails.

GIVE US PERMISSION TO SUBMIT A SAMPLE.

Albany Foundry Company,

Manufacturers of the Argand Line of Gas Appliances,

Albany, N. Y.

PHILADELPHIA BRANCH:
HEATH STOVE REPAIR CO., Managers, 136-138 North 2d St.

No. 20-16 and 20-18 Argand Range.

DIMENSIONS.

Depth of top,	24 inches.
Width of top, including two shelves,	38 "
Height of Range,	24 "

GEORGE ORMROD, Mangr. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

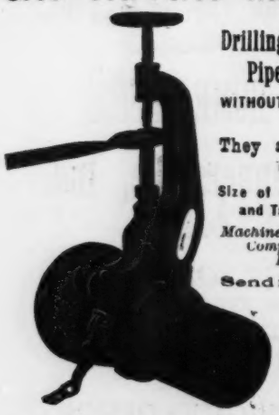
CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—



Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

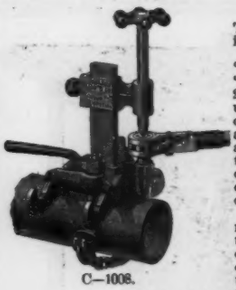
Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

MUELLER
DRY PIPE TAPPING MACHINE.



C—1008.

Mueller Dry Pipe Tapping Machines, including the Mueller "Regular," "Our Special" and "Our Special No. 2," comprise a line unequal for their class of work. They are made strong, are easily attached to the pipe, and are easy to operate under all conditions of use. All dry pipe machines make taps from ⅝ to 3-inch in any size of pipe. Unconditionally guaranteed. Catalogues upon application.

H. MUELLER MFG. CO.,
Decatur, Ill., U. S. A. New York, N. Y., U. S. A.

"THE MINER"
Globe Street and Boulevard Lamps.
Cheapest and Best
THOUSANDS IN USE WITH INCANDESCENT BURNERS.
Send for Catalogues.
THOMAS T. W. MINER,
821-823 Eagle Av., N.Y.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.

CAST IRON WATER AND GAS PIPE,

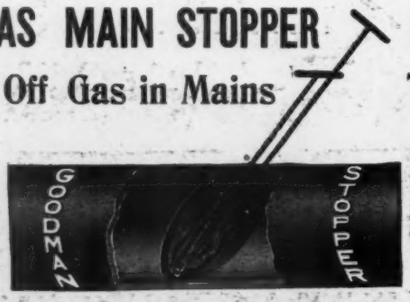
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 552 E. 135th St., New York City.

TELPHER CARRYING COAL

from cars to storage at plant of the Rome Gas Light Co., Rome, N. Y. *Capacity of hoist,* 2,500 *pounds;* its speed, 60 feet a minute; conveying speed, 600 feet a minute. Timber construction spans railroad track and public street, preventing obstruction to travel.

Write for Booklet 53.

UNITED TELPHERAGE DEPARTMENT
The Dodge Coal Storage Co.

PHILADELPHIA—Hunting Park ave. & P. & R. Ry.
NEW YORK—49 Dey street.
BOSTON—164 Federal street.
CHICAGO—39th street and Stewart avenue.
PITTSBURGH—1501-2 Park Building.
PORTLAND, ORE.—309 McKay Building.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

Four Roll Troughing Idler
FOR WIDE BELTS.
The positions of the rolls conform to a natural and uniform curve of the belt.

BELT CONVEYORS

EQUIPPED WITH

BALL BEARING ROLLS

Possess greater efficiency, consume less power, and the belts last much longer than when any other type of roll is employed.

Permit us to tell you why and to submit plans and estimates.

The Link-Belt Machinery Co.
Link-Belt Engineering Co. Philadelphia Chicago USA

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

MARCH, 1906.

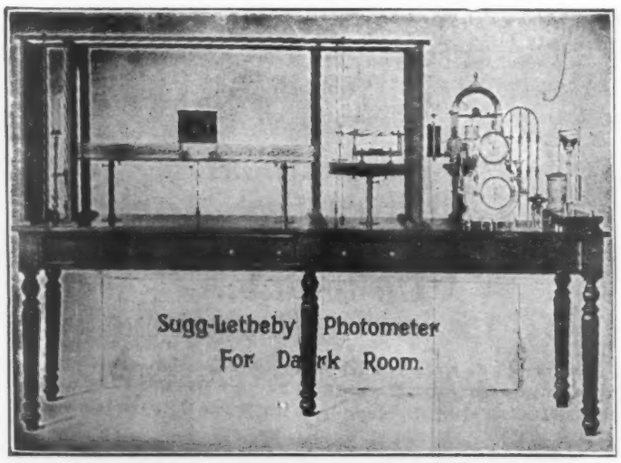
Table No. 1.
FOLLOWING THE MOON.

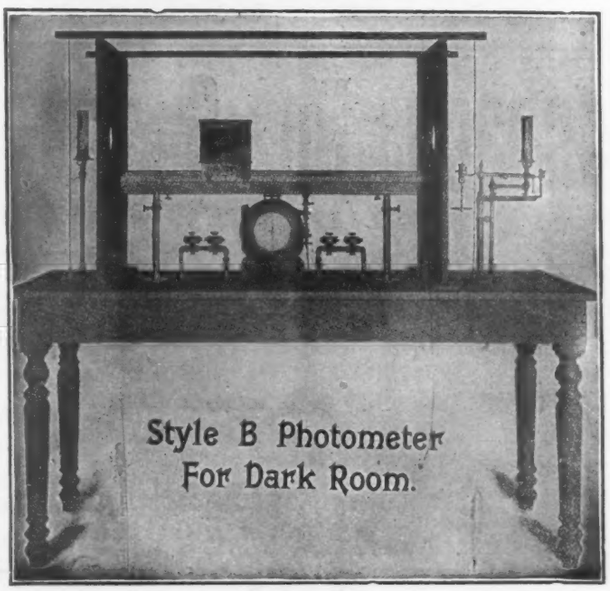
Day of Week.	Date.	Light.	Extinguish.
Thu.	1	11.00 PM	5.40 AM
Fri.	2	12.00 FQ	5.40
Sat.	3	12.50 AM	5.40
Sun.	4	1 40	5 30
Mon.	5	2.30	5.30
Tue.	6	3.20	5.30
Wed	7	4.00	5.30
Thu.	8	4.40	5.30
Fri.	9	No L.	No L.
Sat.	10	No L. FM	No L.
Sun.	11	No L.	No L.
Mon.	12	6.30 PM	9.20 PM
Tue.	13	6.30	10.30
Wed.	14	6.30	11.40
Thu.	15	6.30	12.50 AM
Fri	16	6.30 LQ	2.00
Sat.	17	6.30	3.00
Sun	18	6.40	3.50
Mon.	19	6.40	4 40
Tue.	20	6.40	5 00
Wed.	21	6.40	5.00
Thu.	22	6.40	5.00
Fri.	23	6.40	5.00
Sat.	24	6.40 NM	5.00
Sun.	25	6.50	4.50
Mon.	26	6 50	4.50
Tue.	27	6.50	4.50
Wed.	28	6.50	4.50
Thu.	29	9.50	4.50
Fri.	30	10.40	4.50
Sat.	31	11.30	4 50

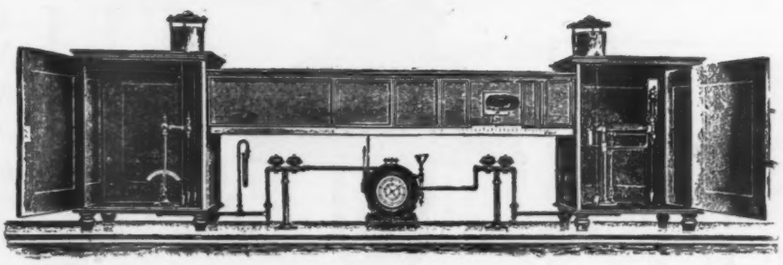
TOTAL HOURS DURING 1906.

By Table No. 1.

	Hrs.Min.
January	223.40
February	190.40
March	192.10
April	167.00
May	152.20
June	142.10
July	150.20
August	157.40
September	170.00
October	185.10
November	201.40
December	214.00
Total, yr.	2146.50







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

MARCH, 1906.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Light	Extinguish.
		P. M.	A.M.
Thu.	1	5.30	5.45
Fri.	2	5.30	5.45
Sat.	3	5.30	5.45
Sun.	4	5.30	5.45
Mon.	5	5.40	5.35
Tue.	6	5.40	5.35
Wed.	7	5.40	5.35
Thu.	8	5.40	5.35
Fri.	9	5.40	5.35
Sat.	10	5.40	5.35
Sun.	11	5.40	5.35
Mon.	12	5.50	5.20
Tue.	13	5.50	5.20
Wed.	14	5.50	5.20
Thu.	15	5.50	5.20
Fri.	16	5.50	5.20
Sat.	17	5.50	5.20
Sun.	18	5.50	5.20
Mon.	19	6.00	5.10
Tue.	20	6.00	5.10
Wed.	21	6.00	5.10
Thu.	22	6.00	5.10
Fri.	23	6.00	5.10
Sat.	24	6.00	5.10
Sun.	25	6.00	5.10
Mon.	26	6.10	4.55
Tue.	27	6 10	4.55
Wed.	28	6.10	4.55
Thu.	29	6.10	4.55
Fri.	30	6.10	4.55
Sat.	31	6.10	4 55

TOTAL HOURS DURING 1906.

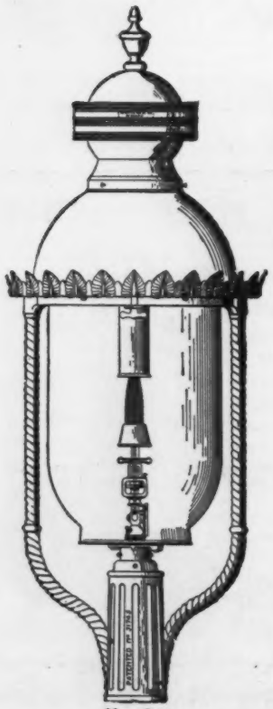
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

The Welsbach No. 6 Harp Fixture.

AN IDEAL LIGHT FOR DINING OR LIVING ROOMS.

THE HIGHEST MECHANICAL INGENUITY COMBINED WITH ORNAMENTAL BEAUTY--THE NEWEST OUTPUT FROM THE WELSBACH FACTORIES.

Equipped with new model No. 66 high candle power Welsbach Burner.

Side Pilot By-pass Tube covered with refractory sleeve to prevent bending.

Fourteen-inch Opal Dome Shade.

Polished Brass Embossed Crown 2¼ inches high.

Length of Fixture, 30 inches.

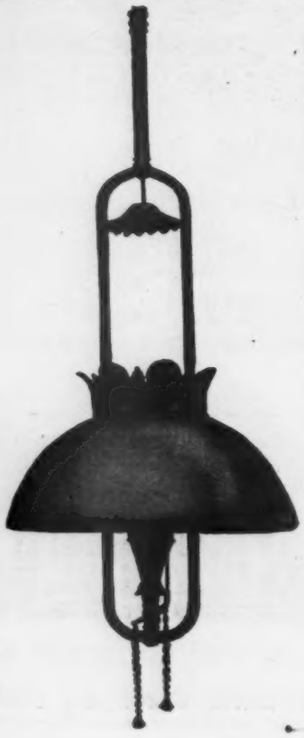
Width of Harp, 4½ inches.

Finished in Polished Brass.

Packed One Dozen to the Case.

List Price, per Dozen, $45 00.

We recommend equipping the No. 6 Harp Fixture with No. 4197 Intensive Brand Mantle, and the No. 306 **F. Q. M.** Clear Glass Air-Hole Cylinder.



Although the 14-inch Opal Dome Shade is standard equipment, we are prepared to furnish Dome Shades in green, pink or yellow (opal lined), and will be glad to quote prices.

WELSBACH CO.,

Salesrooms in all the principal cities of the United States.

Factories:

GLOUCESTER, N. J.

CHICAGO, ILL.

THE UNITED GAS IMPROVEMENT COMPANY

For the Year Ending December 31st, 1905, has been Awarded Contracts for 40 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

Catasauqua, Pa.
Plattsmouth, Neb.
Detroit, Mich. (2d contract).
Springfield, Ills.
Oneonta, N. Y. (2d contract).
Pottsville, Pa. (2d contract).
Evansville, Ind. (2d contract).
Lansdale, Pa.
Hempstead, N. Y. (2d contract).
New Britain, Conn.
New York, Mutual Co. (3d contract)
St. Louis, Mo. (4th contract).
Sioux City, Ia. (3d contract).
Amsterdam, N. Y.
Houston, Tex. (2d contract).
Hamilton, O. (2d contract).
Indianapolis, Ind. (2d contract).
Nanticoke, Pa.
Hazleton, Pa.
Mahanoy City, Pa.
Ludington, Mich.
Ossining, N. Y.
Lancaster, Pa.
Flushing, N. Y. (2d contract).
South Bend, Ind.
Fall River, Mass. (2d contract).
Minneapolis, Minn. (2d contract).

TOTAL SETS TO DECEMBER 31, 1905, ... 593
TOTAL DAILY CAPACITY TO DECEMBER 31, 1905, 463,780,000 CU. FT.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas. H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
88 VAN DYKE ST., BROOKLYN, N. Y.
MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

ST. LOUIS GAS CONSTRUCTION CO.,

DESIGNERS AND BUILDERS OF

COAL GAS BENCHES,

SPECIAL HIGH GRADE REFRACTORY MATERIAL FOR BENCH SETTINGS AND WATER GAS LININGS.

SOLE AGENTS FOR

CHRISTY SETTINGS.

CORRESPONDENCE SOLICITED.

ST. LOUIS, MO.

FIELD'S ANALYSIS FOR THE YEAR 1904.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 36th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by

A. M. CALLENDER & CO., 42 Pine St., New York City.

ALBERT J. WEBER, President and General Manager.
Established 1846.

Adam Weber Sons.

Manhattan Fire Brick and Enameled Fire Clay Retort Works.

Works at Weber, on the Raritan River. Middlesex County, New Jersey.

GENERAL OFFICES:
Park Row Building, New York City.

Modern Coal Gas Benches,

With either Horizontal or Inclined Retorts, Half-Depth and Full-Depth Recuperative Furnaces.

ADAM WEBER PATENTS

STANDARD BENCH IRONWORK.

Linings for Water Gas Apparatus, High Grade Fire Brick of All Shapes and Sizes, Ground Fire Clay, Ground Fire Brick in Bulk or in Barrels.

ISAAC C. BAXTER, President.
Works.
LOCKPORT STATION, PA.

ESTABLISHED 1864.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

PETER YOUNG, Secretary and Treas.
Address all communications to
JAMES GARDNER, JR., CO., Room 202 Lewis Bldg
PITTSBURGH, PA.

Fire Clay Goods for Gas Works.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. PITTSBURGH, PA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
1200 Bank for Savings Bldg., Pittsburgh, Pa.

NATIONAL PYROGRANIT COMPANY,

MANUFACTURERS OF

Fire Brick, Tiles, Special Shapes, etc.

NEW YORK OFFICE:
17 Battery Place, New York.

WORKS:
South River, N. J.

ESTABLISHED 1868.

L. N. RANCKE, Vice-Pres. & Mgr. F. SCHIAFFINO, Sec'y & Treas.

BALTIMORE RETORT & FIREBRICK CO.

BALTIMORE, MD.,

Manufacturers of all Material for the Construction of Coal Gas Benches.

HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

INCLINES—We have in SUCCESSFUL OPERATION benches of Inclined Retorts, MANUFACTURED and ERECTED by us.

WALDO BROS., 102 MILK ST., BOSTON, MASS.,
Agents for New England States.

LARGE FACILITIES—Correspondence Solicited.
RAIL and WATER CONNECTIONS to ALL POINTS.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** *The* **Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office:
411 Olive Street,
Continental Bank,
ST. LOUIS, MO.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

G. A. BRONDER,

Contracting Engineer and Builder,

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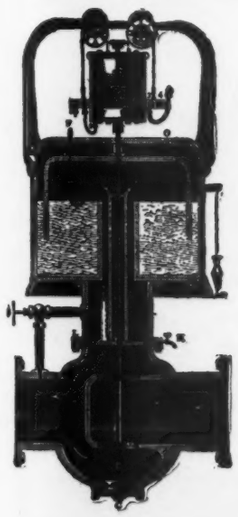

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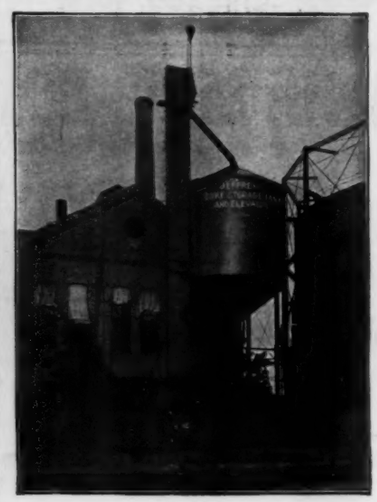

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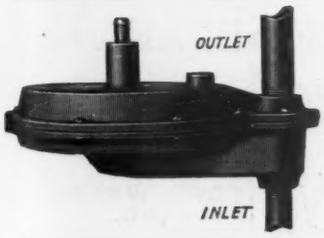

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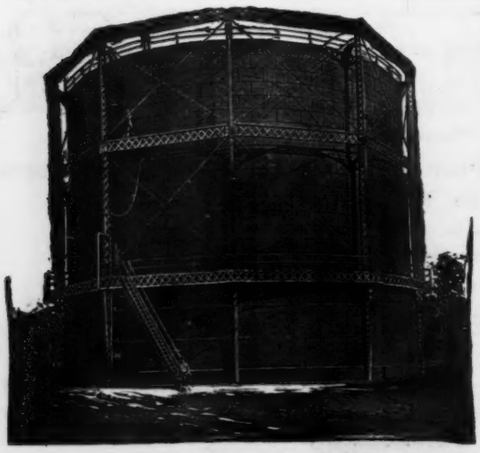

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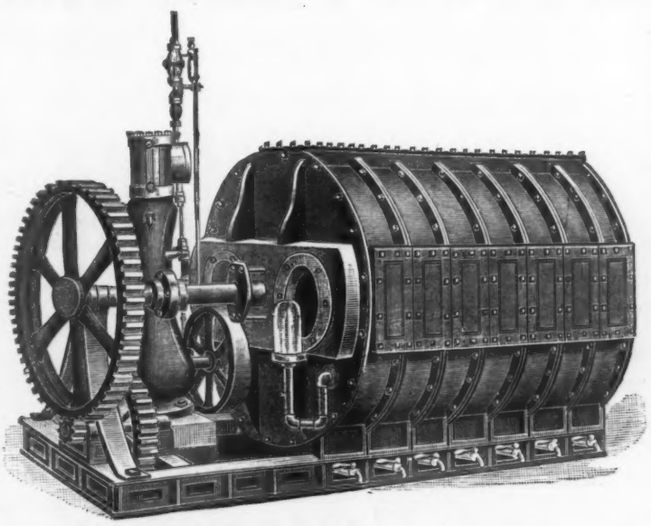

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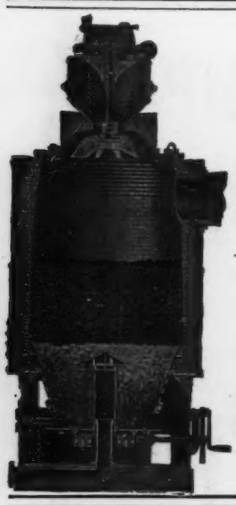

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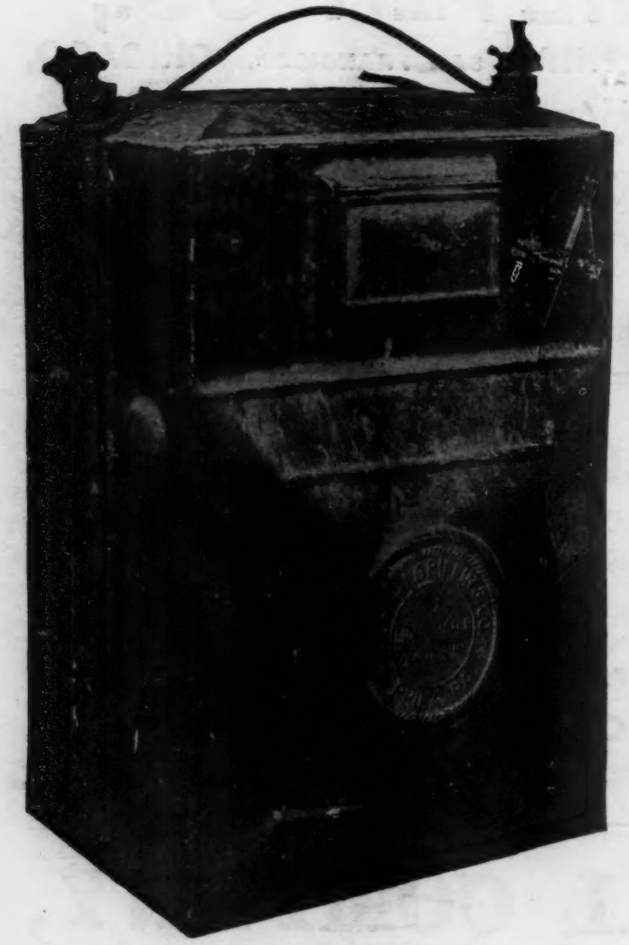

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